DECEMBER 1959

IN THIS ISSUE:

Waste plant produces own electricity ..... **page 13**
Tarpaulin eliminates fire hazards ..... **page 14**
Pumphouse goes piggyback ..... **page 20**

PLUS over 90 reports on technical developments, new solutions and new literature for effective plant and power services

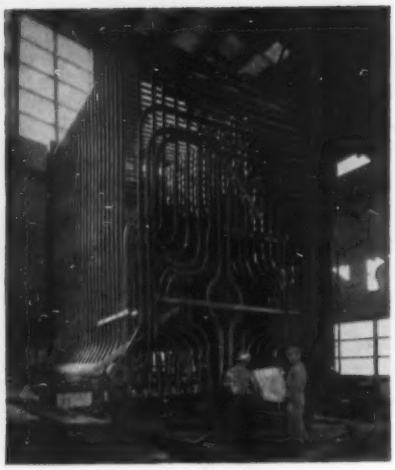
Plant and Power Services Engineer

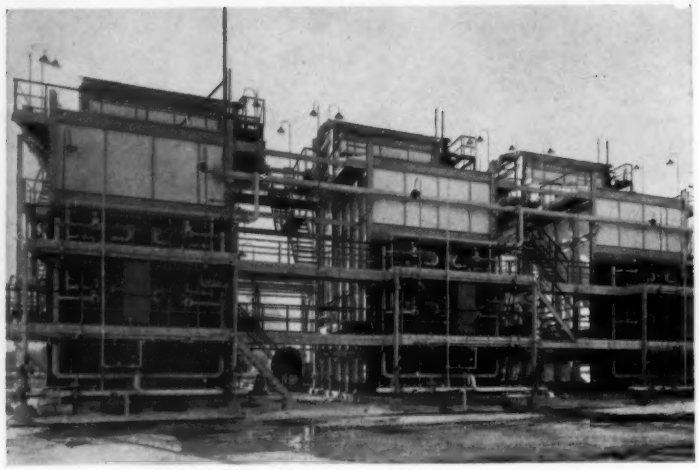
how EASTMAN KODAK engineers Plant and Power Services

In a new series, PLANT and POWER SERVICES ENGINEER presents the story of reader R. L. YOUNG and his utilities engineering group

University Microfilms
313 N. First St.
Ann Arbor Mich
Date Comp 1-60 PI

A PUTMAN PUBLICATION
Executive Magazines for Industry
Over 60,000 copies of this issue
$1.00 the copy





AT LEFT: Installing a 60,000 lbs/hr unit in a brewery

ABOVE: A battery of 125,000 lbs/hr units in a chemical plant

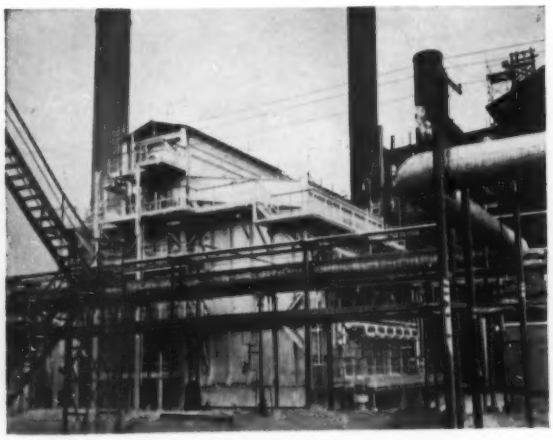
CUSTOM *Steam* GENERATORS by Vogt

Vogt engineering advances can save you money if you have a steam generating problem. Custom-built installations shown, are engineered to assure efficient, dependable steam generation for power, process and heating. Our engineering staff is available to give effective help in the solution of steam generating problems peculiar to a wide variety of operating conditions. Address Dept. 24A-BIP.

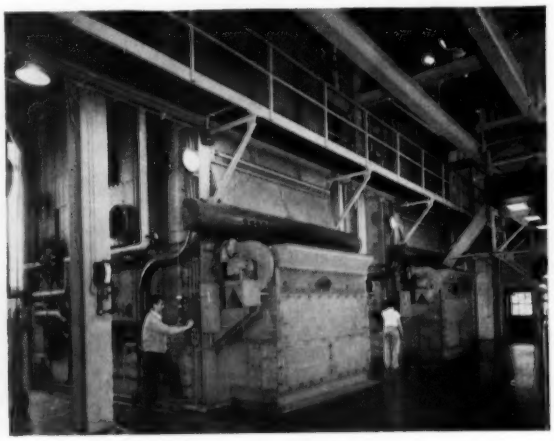
HENRY VOGT MACHINE CO.
LOUISVILLE, KENTUCKY

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J., St. Louis, Charleston, W. Va., Cincinnati

Vogt LOW WATER BOILERS



This 400,000 lbs/hr unit is installed in a leading petroleum refinery



Three 40,000 lbs/hr units serve a medical center

Circle 9758 inside back cover.

THAT'S INTERESTING

Weapons, missiles take to ice caves

Ice caves may soon be used for the storage of weapons, food, dumps, guided missile launching bases and entire military bases, according to Dr. Ronald O. Rausch in the *Colorado School of Mines Quarterly*.

His project studied glacier features, feasibility of using coal-mining machinery and explosives for excavating tunnels and rooms beneath the ice surface and charted the behavior of such openings under various weather conditions.

Perishable food, vehicles, storage batteries, electric motors and military equipment were stored during the winter months of 1955 through 1958. They were found in exactly the same condition the following spring.

Saved by the signal

A special signal transmitted over utility networks would alert the population to take precaution in case of danger due to enemy attack, such as bombing, missiles, or radioactive fallout, or in natural disasters such as tornadoes or floods.

Known as the National Emergency Alarm Repeater—the system utilizes electric power networks, over which are transmitted 240-cycle signals which activate special low-cost receivers in homes, offices, and factories.

Easy entry

A system has been developed in Britain for reducing heavy waves and creating areas of calmed water at the entrance to harbors.

Using polyethylene pipes and fittings, a pneumatic breakwater has been installed at the important port of Dover, England.

To inside back cover

Nov. 29-Dec. 4: ASME Annual Meeting; Chalfonte Haddon Hall, Atlantic City, N.J.

Nov. 29-Dec. 4: Exposition of Chemical Industries; New York Coliseum, New York, N.Y.

Dec. 1-4: National Warm Air Heating and Air Conditioning Committee Meetings and Annual Convention; Chase Hotel, St. Louis, Mo.

Jan. 25-28: Plant Management & Engineering Show; Convention Hall, Philadelphia, Pa.

Feb. 1-4: Industrial Electric Heating Conference; Netherland-Hilton Hotel, Cincinnati, Ohio.

Feb. 1-4: American Society of Heating and Air Conditioning Engineers; Dallas, Tex.

Feb. 3-4: Annual Midwest Welding Conference; Illinois Tech Chemistry Bldg., 3255 S. Dearborn St., Chicago, Ill.

Feb. 5-6: Industrial Management Engineering Conference; Illinois Institute of Technology, Chicago, Ill.

Feb. 14-18: National Association of Corrosion Engineers; Memorial Auditorium, Dallas, Tex.

Mar. 14-18: NACE 16th Annual Conference and 1960 Corrosion Show; Dallas, Tex.

Mar. 23-26: Electrical Industry Show and Lighting Exposition; Shrine Exposition Hall, Los Angeles, Calif.

Mar. 6-9: National Electrical Industries Show; New York Coliseum, New York, N.Y.

Mar. 29-31: American Power Annual Conference, sponsored by Illinois Institute of Technology; Hotel Sherman, Chicago, Ill.

Apr. 12-14: PIEA-PESA Annual Conference and Exhibition; Municipal Auditorium, Kansas City, Mo.

Apr. 25-29: American Welding Society Annual Meeting and Exposition; Los Angeles, Calif.

Does specialized business publication advertising pay?

No one is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front... the men the ads are supposed to help... the men who sell.

Here are the statements of salesmen who know what advertising does for them when it appears in the industrial, trade or professional publications that serve the specialized markets to which they sell:

Glen Chase
Yarnall-Waring Company
sells to industry

Says Mr. Chase:

"I have been selling *Yarway* products for over seven years, and I'll have to admit that I've taken the trade paper advertising for granted. But when I stop to think I realize it's out there working for me all the time.

"For instance, I never have to tell my prospects who YARNALL-WARING is, or what they make. Often I don't even have to tell them why they should see me and find out what I've got to offer. The advertising has done much of the *who, what,* and *why* of selling before I make my contact.

"Here's an example: I recently had a phone call from a potential customer that I'd never even called on. He was having trouble with a competitive product. He'd seen our ads and wanted to try my product. That's one time when my sale consisted merely of writing the order. Advertising really made the sale.

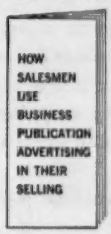
"The advertising has given people a good impression of our company, too. This is surprising, when you stop to think about it, because we are a relatively small organization.

"Our company name is YARNALL-WARING but a great many people say '*Yarway*'. I believe this use of our trade-mark may be due to the wide use of the company trade-mark in our trade paper advertisements, on our product name plates, shipping cartons and stationery."

Ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable, you can be sure that your business publication advertising is really helping them sell. If too many answers are negative, it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.

How salesmen use their companies' advertising to get more business

Here's a useful package of ideas for the sales manager, advertising manager or agency man who would like to get more horsepower out of his advertising. Send for a free copy of the pocket size booklet which reports the successful methods employed by eleven salesmen who tell how they get more value out of their companies' business publication advertising.



You can be sure that more of your salesmen will use your advertising after they read how others get business through these simple methods. The coupon is for your convenience in sending for your free copy.

NATIONAL BUSINESS PUBLICATIONS, INC.
Department 7E
1913 Eye St., N.W.
Washington 6, D. C. STerling 3-7533
Please send me a free copy of the NBP booklet "How Salesmen Use Business Publication Advertising in Their Selling."

Name _____
Title _____
Company _____
Street Address _____
City _____ Zone _____ State _____

National Business Publications, Inc.

NBP

...each of which serves a specialized market in a specific industry, trade or profession.

Specifically speaking about this issue

As we approach the end of a year, we always take a little time out to review the past year's events. We also can use this moment to judge the things we have done editorially. Sometimes, we like even to take this opportunity to pat ourselves on the back a little.

I am speaking specifically about some of the 'big' stories we presented this past year — the type of stories editors dream about . . . those containing fresh ideas . . . lots of news value . . . of special interest and value to you, our readers . . . stories like:

- **The naked truth about the nuclear power situation as reported by Robert Wilson**
- Should you lease plant and power services equipment?
- **The 'cute' tricks employed in SAGE's cable tray installation**
- The bright outlook in industrial lighting
- **Our 'exclusive' on a new large-capacity packaged coal-fired boiler**
- How to beat those nasty air-conditioning water problems
- **Is sea water conversion the answer to future water supply shortages?**
- Taxation's stranglehold on depreciation
- **High-temperature hot water can cool, too**
- The first application of a new, important insulation product
- **Where you stand in the air pollution legislation picture**
- The report on year-round operation of a northern industrial heat pump
- **U.S. venture into geothermal power . . . putting 'Old Faithful' to work**
- What centralized lubrication can do for you
- **"The Importance of being Earnest" . . . when it comes to fuel cost evaluations**

Reflecting on things past, of course, always brings about the contemplation of things present and future. And, talking of things to come, we are planning to make 1960 — and the years to come — even bigger.

Right now, we are starting a series of articles that will run throughout the next year — and which we think you will find very interesting. These will be a series of 'profiles' on engineers just like you. These profiles are going to delve into the very hearts of plant and power services engineers' operations to tell you how these men manage the many facets of the services they provide.

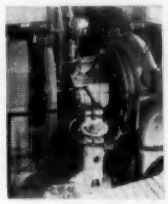
Our first profile throws the spotlight on Richard Young and his utilities engineering group, which handles the engineering of all the plant and power services at Eastman Kodak's large installation in Rochester, N.Y.

Also, while our editor was in Rochester he picked up a pretty interesting story on how Eastman Kodak's waste treatment plant generates its own electricity. Secret is a hydrogenerator through which the waste flows. Besides producing electricity, the unit also cuts down head and stops foaming.

New materials produce improved versions of common-day products. One such product is a tarpaulin made of nylon mesh covered over with vinyl. This material did a multitude of jobs and increased safety (it will not support combustion) during construction of a power plant.

And, if you don't know where to put your plant-water pumphouse, try putting it on top of the storage tank. Central Fibre did and realized many advantages.

FIRST PROFILE



PRODUCES OWN POWER

INCREASED SAFETY

PIGGYBACK PUMPHOUSE

George V. Michael

NATIONAL BUSINESS PUBLICATIONS, INC.

BUSINESS PUBLICATIONS AUDIT of circulation, Inc. BPA

Published Monthly by
PUTMAN PUBLISHING COMPANY
PUTMAN PUBLISHING BUILDING
111 E. DELAWARE PLACE, CHICAGO 11, ILLINOIS
WHITEHALL 4-6141

Also publishers of
CHEMICAL PROCESSING
FOOD PROCESSING
FOOD BUSINESS

©*Putman Publishing Company 1959*

DECEMBER, 1959
VOLUME 1 NUMBER 8
(as Plant and Power Services Engineer)

Plant and Power Services Engineer

Serves the professional, technical, and practical interests of the engineers who design, install, maintain and/or operate the plant engineering services and power engineering services in industry, utilities, large service installations—and consulting and construction engineers and firms concerned with the plant and power services.

IN THIS ISSUE

6 Sea water conversion program moves ahead
13 Waste plant produces its own electricity—and then some!
14 Flame-proof tarpaulin reduces fire hazards during power plant construction
16 How plant and power services are engineered at Eastman Kodak
20 Pumphouse goes piggyback
22 Gets easy, quick make-and-break with hydraulic coupling
23 Stops ash plug-up, reduces maintenance
24 Prevents pipeline condensation at half the insulation thickness
25 Bronze valves withstand water treatment chemicals
26 Measures torque to 400 lb-inch
28 Bus duct system features safety, ease-of-installation
29 One way to control temperatures when load swings are wide

MONTHLY FEATURES

2 THAT'S INTERESTING
3 CONVENTIONS & EXHIBITS
6 REPORTS IN BRIEF
12 LETTERS
22 NEW SOLUTIONS
26 NEW DEVELOPMENTS
33 NEW LITERATURE
35 ENGINEERING DATA
38 PHOTO NEWS

EDITORIAL STAFF

editorial director & publisher
Russell L. Putman
editor
H. A. Countryman
managing editor
George V. Michael
west coast editor
Karl Robe
advisory editor
John W. Bishop
advisory editor
Richard F. O'Mara
art director
Ralph C. Donges
editorial assistant
Elicia Tippens
production assistant
Loretta Carlson

ADMINISTRATION

president
Russell L. Putman
vice president & treasurer
Ewing W. Graham
vice president research
George W. N. Riddle
sales manager
Richard H. Putman
production manager
Roy G. Helsing
asst. production manager
James C. Budd
director of circulation
Thomas J. Scanlon
circulation manager
Robert C. McKay

Advertising Representatives listed on page 42

Special Service for Readers
Want more information? Circle the key number of advertisement or editorial on the cards opposite back cover of this issue.

SUBSCRIPTIONS

QUALIFIED READER SUBSCRIPTIONS are accepted without charge from selected executives and engineers who manage plant and power services in plants and organizations. Subscriptions are accepted from "non-qualified people" — i.e., those whose job responsibilities are not within the orbit of management as described above — at $1.00 the copy; $10.00 the year in U.S.; $35.00 outside U.S. Note: Such subscriptions are available only as an accommodation and in response to specific request. They are not counted as "industry circulation" on BPA Audit Reports. Accepted as controlled circulation publication at Mendota, Ill., 1501 W. Washington Rd.

don't guess Liquid Levels...

Specify a Liquidometer Gauge

Easy to read as a clock. A Liquidometer Gauge indicates the exact level at all times ... shows it at a glance. And gauge operation is completely automatic – as far as 250 feet from the tank – without need for auxiliary power of any kind.

A Liquidometer Tank Gauge measures virtually any liquid. It's simple to install – requires no maintenance. Many have provided over 30 years of efficient, dependable service. All are approved by Underwriters' Laboratories and Factory Mutual.

Whether your gauging needs require an automatic Liquidometer Gauge, a hydrostatic Levelometer or a tank-site-indicating Direct Reader, you'll get the best by specifying Liquidometer. For complete details write Dept. P.

Since 1920 ...of proven quality

THE LIQUIDOMETER CORP.

LONG ISLAND CITY 1, NEW YORK

Circle 9759 inside back cover.

REPORTS IN BRIEF

Sea water conversion program moves ahead

Secretary of the Interior Seaton has announced approval of contracts for architect and engineering services for the first three saline water conversion demonstration plants.

A $62,000 contract for the long-tube vertical multiple effect distillation process plant to be constructed at Freeport, Texas, has been awarded to W. L. Badger and Associates of Ann Arbor, Michigan. The gulf coast plant will be designed to convert sea water to fresh at the rate of one-million gallons per day.

Fluor Corporation has been awarded a contract for architect and engineering services on the West Coast multistage flash process plant. This plant will also be designed to convert sea water to fresh at the rate of one-million gpd.

Responsibility for engineering the electrodialysis process plant has been assigned to the Bureau of Reclamation, Denver, Colorado.

This plant will be designed to convert brackish water to fresh at the rate of 250,000 gallons per day, and will be located in the northern great plains or the southwest.

The Office of Saline Water of the Department of the Interior has also published a report on new and improved methods for lower cost solar distillation of saline water. The report covers research carried out by New York University and includes studies of both single effect solar stills and larger multiple effect solar stills.

Another report to the Saline Water Office covers an investigation of the availability of geothermal energy for the demineralization of saline water. This report indicates that neither the "hot wells" in the Black Hills region of South Dakota nor those in California can produce temperatures high enough for economical salt water conversion.

Heat exchanger guide is full of details

An attractive, easy-to-read manual contains much information on heat exchanger design and construction.

The spiral-bound book pictures in detail heat exchanger components and simplifies selection of the right design for the job.

In addition, basic data on heat exchangers and heat transfer round out the engineering information. Complete corrosion data are presented in four-page table.

You may receive your copy of this manual by writing on your company's letterhead to The Patterson-Kelley Co., Dept. P&PSE, East Stroudsburg, Pa. Ask for Manual No. 700-A.

Lack of lighting engineers foreseen

Unless more engineering students indicate an interest in the lighting field, more than 3000 jobs in the lighting profession will be going begging during the next five years, according to George J. Taylor, president of the Illuminating Engineering Society.

Lack of new engineers will seriously endanger the development of new techniques in the lighting profession.

The society, which is the only professional organization of lighting engineers and designers in North America, cooperates with many American colleges and universities to create interest in lighting through an annual Allied Arts Contest.

How to start diesels at low temperatures

Diesel engines can be started and operated at temperatures down to −65°F if correct fuels and lubricants, adequate heating, and sufficient cranking speeds are used, according to an Army report.

Heat directed to the engine manifold, cylinder walls, combustion chamber, crankshaft bearing, and other strategic areas where cold lubricants offer resistance to cranking is recommended for best results. Various heating methods, including the use of heat-retaining unit enclosures, are described and discussed.

It was also found that an additive such as diethyl ether is required to promote diesel fuel ignition. Research pertaining to the field of priming aids and devices is summarized. Another important factor considered is the know-how of experienced operators.

A review of research toward high-speed cranking systems which may reduce or eliminate the need for heating devices is presented. Results of such research may also be applicable to internal combustion engines.

The 43-page report "Starting of Diesel Engines at Low Temperatures" may be ordered from OTS, U.S. Dept. of Commerce, Washington 25, D.C. Price is $1.25.

The answers to 29 questions

"I Want to Know About the Electric Industry," an informative booklet which answers 29 frequently asked questions about the electric industry has been published by Edison Electric Institute.

It traces the industry's past development and present status in such areas as production and capability, expansion of facilities and construction expenditures, sales, use in the home, in industry and on the farm and the atomic energy program.

Booklet may be obtained from Edison Electric Institute, 750 Third Avenue, New York 17, New York.

Light panels eliminate radio interference

A glass lighting panel that eliminates radio interference radiated from fluorescent lamps has been developed for laboratories, hospitals and other areas where sensitive equipment is used.

The low brightness lens panel, specially treated to serve as a grounding shield, transmits approximately 75 percent of the open troffer illumination.

Manufactured by Corning Glass Works, the product has been introduced for use in research laboratories where delicate electronic equipment is affected by high frequency radiation from the lamps, and in hospitals using electrocardiographs, electroencephalographs, hearing test equipment, and brain-wave detection apparatus. The panels also can be used in radio stores, and in schools for the deaf where radiation affects amplification apparatus.

Panel is coated on one side with a thin, transparent electrically conductive film. The coating intercepts the radiated interference which is grounded by a ¼ inch wide silver strip fired onto the film around the periphery of the glass.

The glass face of the panel will not statically attract dust; can be cleaned with a damp cloth. The hard, electrically conductive coating is permanently fired onto the back surface of the glass. It will not abrade.

The panels are thin and lightweight. A single 24″ by 48″ panel of the glass meets Underwriters' Laboratories, Inc., requirements permitting up to 1100 square inches of exposed area.

Status report on fuel cells

A recently appointed Army Fuel Cell Steering Committee has gathered data on advancements in the field and published its first report on the current status of fuel cell development.

All fuel cell activities currently pursued or planned by the Army are described, as well as some of the work of the other agencies. The report reviews military requirements and interest and contains a general description of the fuel cell operation, descriptions of a variety of fuel cell systems, a general discussion, a review of the Department of Defense supported program, a summary, and references.

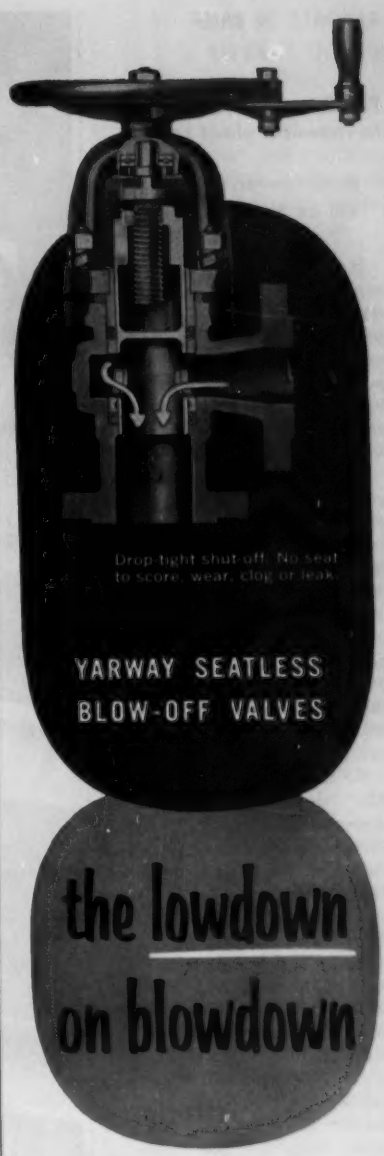
The 119-page report "Status Report on Fuel Cells" may be ordered from OTS, U.S. Department of Commerce, Washington 25, D.C. Price is $1.25.

Plant to install largest silicon rectifier

The nation's largest silicon rectifier power conversion system will be installed by General Electric next year at the Olin Mathieson Chemical Corporation's Niagara Falls, N. Y. plant.

Four water-cooled silicon rectifiers, providing a total of 100,000 amps at 270 volts DC, will be used in the 27,000-kw power conversion system. The installation represents the chemical manufacturer's first major installation of silicon rectifiers.

Olin Mathieson will use the specially designed and built power conversion system to convert 60-cycle electric power into direct current for the operation of chlorine-caustic cells. In connection with its present $6 million expansion and modernization program, it is installing new electrolytic cells and converting the electrical system from 25 to 60 cycles.



Over 16,000 boiler plants depend on Yarway Seatless Blow-Off Valves. Pressures to 600 psi. Single or tandem combinations. For free Blow-Off Valve Book write YARNALL-WARING Co., 100 Mermaid Ave., Philadelphia 18, Pa.

Branches in all principal cities.

go YARWAY with confidence

Circle 9760 inside back cover.

Predicts radical approach to chemical plant safety

Exotic power sources will be key

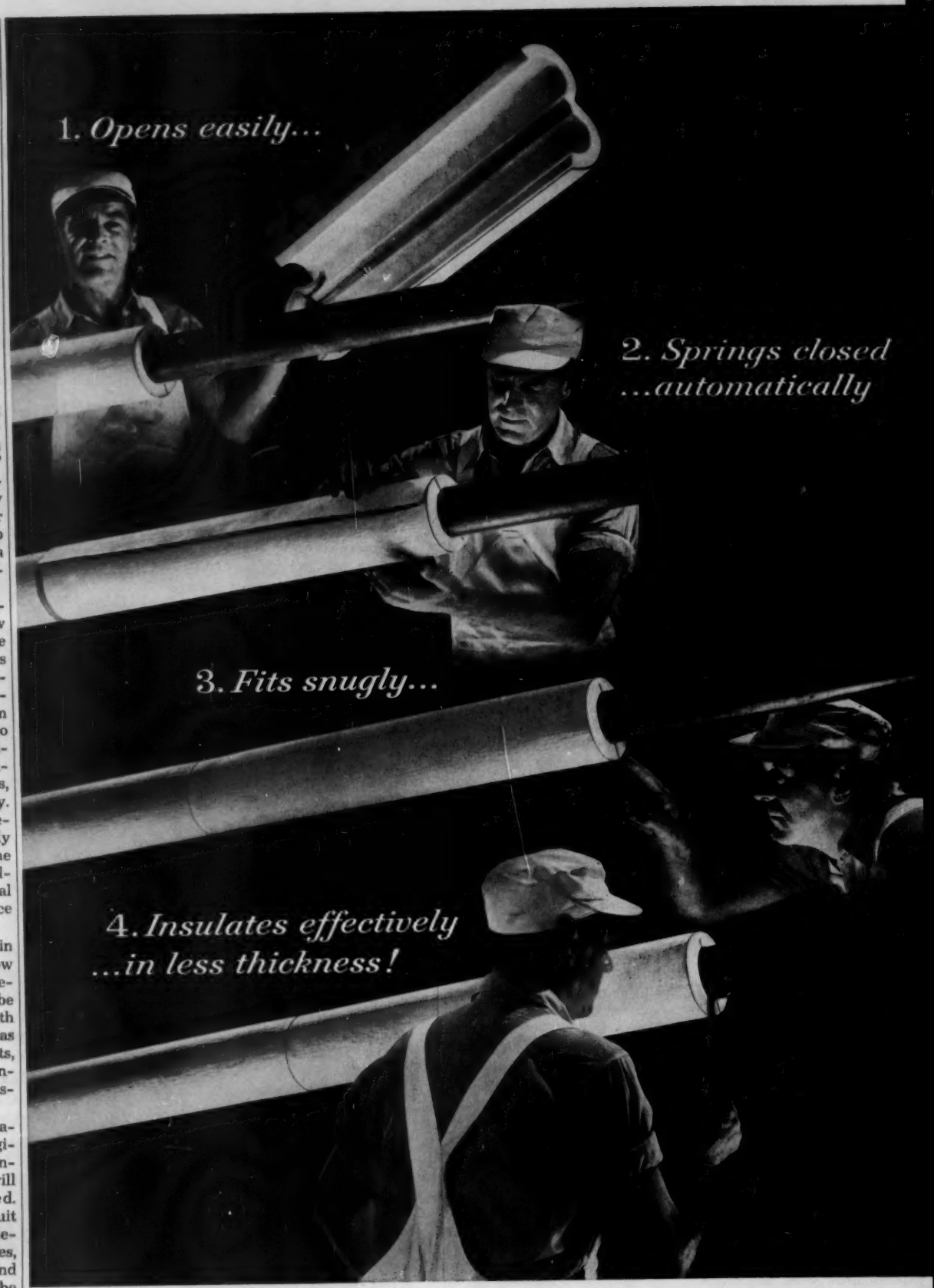
Revolutionary new techniques of industrial safety engineering will be developed to keep pace with the phenomenal growth of the chemical processing industry, according to A. H. Christian, corporate safety engineer for American Viscose Corporation.

Airborne fire-fighting fleets, complete underground chemical processing plants, floating seaborne industrial cities, isolated industrial parks with "atmosphere conditioning," automatic anti-accident devices such as miniature safety packs that would analyze for pre-selected hazards and stop the process—these are but a few of the innovations anticipated by Mr. Christian.

He believes that with scientific development of new sources of energy, future chemical processing plants may well be located deep underground, close to raw materials, and utilize energy from deep within the earth. He also foresees industrial cities floating far at sea close to raw materials from the ocean depths, and using solar or sea energy. Such plants would be remotely controlled and practically uninhabited. A step into the future beyond this will almost certainly see chemical processing plants on space platforms and other planets.

Predicting improvements in chemical operations as we now know them, Mr. Christian believes there will someday be great industrial parks with common services such as chemical waste disposal plants, maintenance groups, and entire areas that are "atmosphere conditioned."

Present processing operations will also be re-engineered to provide for continuous processing which will be remotely controlled. Through use of closed circuit television and rapidly developing electronic techniques, contrast between people and chemical processing will be virtually eliminated. Equip-



Works 4 ways to keep costs low!

Micro-Lok...new Johns-Manville fiber glass pipe insulation saves hours on the job . . . saves fuel and power costs

No pipe insulation does more than Micro-Lok to save installation time and keep insulation costs low!

Micro-Lok opens easily, springs closed automatically because it has full-length "spring-hinge" action in each section. The hinge actually runs the full length of each section. This, plus its one-piece construction, saves on installation costs in many ways. It helps free workers' hands more quickly for sealing tabs and other operations, contributing to over-all efficiency.

Micro-Lok is the first pipe insulation made of fiber glass which was developed for easy cutting and fitting of the inside diameter around joints and fittings, pipe hangers and other irregularities.

Micro-Lok is available in standard wall thicknesses . . . especially ½" and ¾" . . . for all pipe and copper tubing sizes. The insulation is offered in a choice of factory-applied jackets including canvas, vapor-barrier and flame-resistant . . . to cover a wide range of operating conditions.

For further information on sizes, thicknesses and applications, contact your nearby Johns-Manville representative. Or write to Johns-Manville, Box 14, New York 16, N.Y. In Canada, Port Credit, Ont.

JOHNS-MANVILLE
Fiber Glass

JOHNS-MANVILLE JM PRODUCTS

How Micro-Lok speeds application—improves temperature control—saves fuel dollars

"Spring-Hinge" Action. Easy, full-length opening . . . automatic closing . . . and one-piece construction increase worker efficiency.

Light Weight. Weighs only a fraction as much as other materials . . . yet does a more effective insulating job.

Resists Abuse. Resilient Micro-Lok won't break, crush or crumble during shipment or application. The material is pleasant to handle, too.

Snug Fit. Accurate molding of inside diameters and knitting of fibers at joints provide a tight seal.

Superior Thermal Performance. Its finer, longer fibers create countless heat-trapping air spaces . . . surpassing the efficiency of many commonly used materials and permitting more effective temperature control. For still greater efficiency—a unique manufacturing process gives Micro-Lok uniform insulating performance throughout the section. Temperature limit 350F . . . to sub-zero.

Moisture Resistant. Inorganic glass fibers are noncellular . . . do not absorb moisture . . . won't rot, shrink or swell. They're noncombustible, too.

Circle 9761 inside back cover.

ment will be fail-safe, will check itself out, and will automatically replace faulty miniaturized and unitized components, he predicts.

Boiler, turbine corrosion causes given

Factors that cause destruction of boilers and gas turbines are reviewed and summarized in a new publication by the ASME.

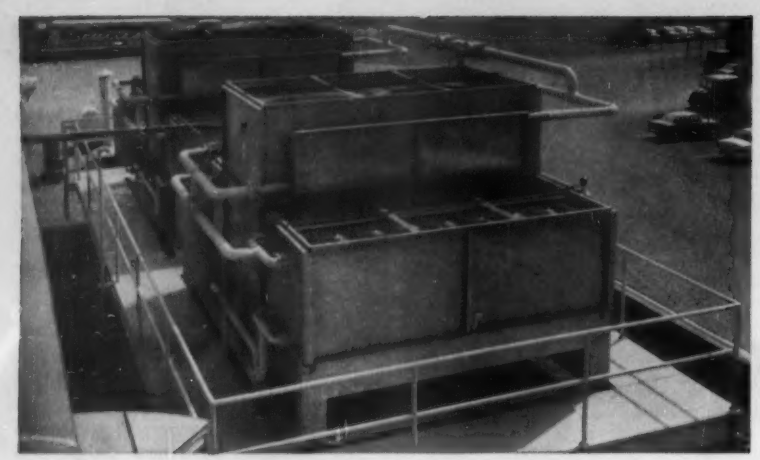
Called "Corrosion and Deposits in Boilers and Gas Turbines" the report is designed to provide an up-to-date survey of all available knowledge in the field.

Divided into seven chapters, chapter one deals with mineral constituents in coal and heavy fuel oil and their behavior during combustion. Other chapters deal with sulfur oxides, physical aspects of deposition; origin and composition of deposits and methods of minimizing them; high temperature corrosion effects and metallic corrosion from gases below 400°F; the removal of solids from combustion gases.

Lists of references at the end of each chapter provide an extensive bibliography of published works.

"Combustion and Deposits in Boiler and Gas Turbines" is available, at $6.00 per copy, from the order department, Dept. P&PSE, ASME, 29 West 39th Street, New York 18, New York.

"Last week you told me to 'go fly a kite.' Now I have a little job for you. . ."



MODERN NIAGARA CONDENSERS PAY FOR THEMSELVES IN EXTRA SAVINGS

These Niagara condensers are lower in first cost and assure you of trouble-free automatic refrigeration. Special features: "Aeropass" coil removes super-heat to give you condensing at lower temperatures and prevent loss of capacity by the scaling of condenser tubes; "Oil-out", oil separator between pre-cooling and condensing coils gives you always an oil-free system; "Panel-Casing" construction gives you access to every part of the condenser for inspection and maintenance. Operating engineers say these condensers "save half the work of running a refrigerating plant". Managers who know costs and profits prove that Niagara condensers bring them great returns in power savings, water savings and reduced maintenance expense.

Write for Bulletins 131 and 142.

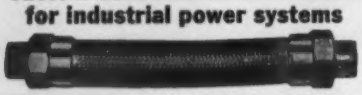
NIAGARA BLOWER COMPANY
Dept. PL-12, 405 Lexington Ave., New York 17, N. Y.
Niagara District Engineers in Principal Cities of U. S. and Canada

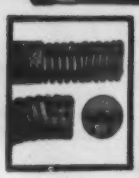
Circle 9762 inside back cover.

COBRA® FLEXIBLE

SEAMLESS METAL HOSE

Custom constructed assemblies for industrial power systems





All sizes in bronze, stainless or carbon steel, monel, inconel and low carbon nickel. Seamless spiral or parallel corrugation... Braided. All type of fittings and flanges welded, brazed or soldered. Also, interlocked hose.

write — wire — phone: RE 7-3311
...for prices and catalogs

COBRA METAL HOSE

5039 S. Kedzie Ave. • Chicago 32, Ill.

Circle 9763 inside back cover.

IN A RUSH?

. . . for some more information.

USE . . .

. . . the handy card at the bottom right of the Reader Service Card on the inside back cover. Just fill it out for the particular information you want, address it to the company mentioned in the article or advertisement, affix a four-cent or airmail stamp, and mail directly to the company.

Aluminum pipeline to be built for fire protection

A 16-inch aluminum pipeline, believed to be the largest ever made of the light metal, will be installed for Superior Oil Company in Lake Maracaibo, Venezuela.

The 1800-foot line will be laid in the lake as a suction line for a fire protection pump at Superior's tank farm. This aluminum underwater pipeline will connect with a steel pipeline leading from shore to the tank farm. The line will have a normal capacity of 2000 gpm delivered to the fire protection system.

Reynolds Metals will supply 25,700 pounds of alloy aluminum for the one-fourth-inch wall pipe which will be fabricated by Graver Tank Corp. at East Chicago, Ind.

Printing plant to have biggest heat pumps

Heating and cooling for a new $5-million publishing plant under construction in Huntington, Ind., will be provided by the largest heat pump system in the country and, possibly, the world.

Receipt of a contract for three 500-horsepower water chilling machines, which will supply the needs of the 200,000 square foot office and printing plant for cooling as well as heating, year-round, has been announced by Carrier Corporation.

Compressors for the installation will be a centrifugal type using the rotative action of impeller wheels spinning at high speeds. According to Carrier these compressors provide larger capacities with fewer units and less maintenance.

It is estimated that space and money will be saved in five major ways by the heat pump system compared to conventional boilers and chillers for providing heating and cooling. These five ways are:

1) Equipment required is reduced 50 percent by the elimination of boilers.

2) One-half the space at $10 per square foot is saved.

3) Absence of fuel storage increases building safety.

4) Fire insurance rates are reduced.

5) Maintenance costs are lowered.

A small amount of supplementary heating equipment will be installed in the plant as a precautionary measure.

Burn coal in diesel engines?

An amazed Senate committee recently heard of a locomotive engineer's dream to restore to the coal industry the huge market it lost through the railroad's dieselization.

It seems an engineer for the Norfolk and Western has developed a method of firing diesels with pulverized coal to the point where he is enlisting the help of university research departments. Estimates are that the cost of coal would be about one-third that of diesel oil, if method can be perfected.

Does air-conditioning improve production of workers?

To find the answer to this question, the Office of Buildings Management, General Services Administration of the U.S. Government, conducted a five-month study during the summer of 1957. The study was conducted in a test wing and in a control wing of a Washington, D.C., building. The work consists of making great numbers of so-called "searches", with each employee being required to complete a minimum quota.

The study indicated that the work output of employees in the air-conditioned area was greater, on an average, by more than 9% than that of employees in the area not air-conditioned. There was also found to be a measurable decrease (2.5%) in absenteeism, a slight decrease on errors, and a measurable decrease in employees living expenses for cleaning, laundry, hairdos, etc.

Water pollution research

Taste and odor in public water supplies will be investigated in a twelve-month research program at the Franklin Institute, Philadelphia, under the sponsorship of the Manufacturing Chemists' Association.

Industry and population growth has led to increased regulatory pressure to insure that public water used in and discharged from commercial or municipal operations shall not be so polluted as to impair its value to other reparian users.

Taste and odor in water are readily detected by the public. As a result, complaints are received by regulatory groups which, though desiring to introduce adequate yet fair controls, are hamstrung for lack of acceptable scales of taste and odor pollution intensity.

Lamp's light output aided by iodine

Lighting engineers have found a new use for iodine. They dust a deposit of concentrated iodine salts at the base of the filament of an incandescent light bulb.

The bulb then burns without blacking and delivers an undiminished amount of white light during its entire life. Ordinary incandescent bulbs, not using iodine, lose some of their light output because of the thin black deposit of burned tungsten.

The iodine removes burned tungsten from the glass sides of the bulb and redeposits it on the filament where it is again "burned" for lighting purposes. The filament thus renews itself until, eventually, it develops a weak spot in a thin filament wire and burns out.

This lighting development, still in experimental form, was demonstrated to 950 lighting engineers, designers, and vision specialists from throughout the United States and Canada at the annual conference of the Illuminating Engineering Society.

Foremen's pay surveyed

A nation-wide foremen's pay survey, including all branches of industry in all sections of the country and in all size groups, reveals that the average salary received by a foreman is $556 a month.

Responses to the survey, conducted by the Employee Relations Bulletin, are from foremen and 866,874 employees. The study also showed that almost two-thirds of all plants pay somewhere between $450-$650 a month; roughly one-eighth pay less than $450 (about $100 a week); and one-fifth pay more than $650. Only one firm in a hundred pays an average foreman's salary as high as $10,000 a year.

A fairly clear pattern emerges from the survey on the question of size of pay envelope according to region. The average wage paid to a foreman is highest among firms in the West, lowest in the South. The spread is $62 a month, or about $15 a week.

In durable goods manufacturing, the average is $562 for the country; in non-durables $549; and in non-manufacturing $553. As would be expected, the larger the firm, the higher the average wage.

Priceless water

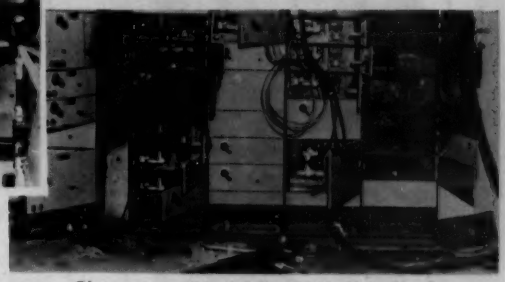
"Priceless Water—It's Your Business" is a provocative, 84-page illustrated book that has been produced in the interest of the water utility industry.

The book is intended as a practical aid to all those responsible for community water service. Four main sections describe "How Good Water Service Benefits You and Your Community," "How to Evaluate Your Water Service," "How to Turn the Evaluation Into Action" and "How to Arouse the Public to Action." Book begins and ends with theme: "Good Water Service Is Good Business."

(Copies of book TR-243A are available from Johns-Manville, Dept. P&PSE, 22 East 40th Street, New York 16, N. Y.)

Circle 9764 inside back cover.

Switchgear accidents can be prevented



Photos courtesy Mutual Boiler and Machinery Ins. Co.

. . . through an adequate preventive maintenance program with *New* CIRCUIT BREAKER TESTERS

. . . designed for field testing all current actuated protective devices

New MULTI-AMP portable test sets have been especially developed for simulating high fault currents and determining tripping characteristics of circuit breakers and other tripping mechanisms. Circuitry provides a continuously adjustable low voltage, high current source for safe and accurate testing. Test unit may be overloaded up to 500% of rating. Instrumentation includes current actuated timer to indicate current flow regardless of output terminal used . . . provides means of measuring elapsed time of test from 0.01 seconds or 0.25 of a cycle to 60 seconds; also measures in minutes and totalizes to 60 minutes. 4½-inch ammeter is accurate to ±2% with pointer preset mechanism. Standard test sets rated 1 Kva to 75 Kva provide simulated fault currents from 50 to 50,000 amperes. Other units can be especially designed to meet your test specifications.

MULTI-AMP Division *Send* for Bulletin SB-CB-1

MULTI-AMP ELECTRONIC CORPORATION

485 LEHIGH AVENUE **UNION, NEW JERSEY**

Circle 9765 inside back cover.

Where there's smoke there's corrosion...

But A. O. Smith smokestacks —glass-protected inside and out—are virtually impervious to condensate attack

For free bulletin containing full facts on why A. O. Smith stacks are your best stack investment, write Dept. PS-129.

Through research ...a better way

A.O.Smith

SMOKESTACK SALES • PROCESS EQUIPMENT DIVISION
P. O. Box 584 • Milwaukee 1, Wisconsin

Circle 9766 inside back cover.

WHAM!

UNARCO

UNIBESTOS® can take it!

IT'S WORTH MORE MONEY!

no other pipe insulation cuts costs so many ways

- No breakage in shipment, handling
- Goes on quicker...cuts, fits easily
- Unharmed by fumes and moisture
- Withstands impact, vibration
- Won't burn, shrink, thermal-shock
- Delivers highest efficiency
- A single layer does the job
- Re-usable...repeatedly

FULL FACTS FREE
Temperatures to 1200°F.; sizes to 44" o.d.; single-layer thicknesses to 5". Ask for Catalog F76-321. It shows why UNIBESTOS saves time and money.

UNION ASBESTOS & RUBBER CO.
General Sales Offices
1111 W. Perry St., Bloomington, Ill.
Distributors in Principal Cities

Circle 9767 inside back cover.

LETTERS

Your views are welcome in this column. Address "Letters, Plant and Power Services Engineer, 111 East Delaware Place, Chicago 11, Ill." Letters should be brief and confined to the editorial of this magazine or other topics of interest to the plant and power services functions.

Looking for good men?

The Civil Engineer Corps of the Navy is going to lose the services of a number of very able, experienced officers because of the critical Navy problem of too many officers in the senior grades. These officers, men in their 40's and 50's, are going to have to retire to take care of the "hump" in our officer numbers and to provide opportunities for the advancement of our junior officers.

The officers who are retiring have excellent educational backgrounds and a wealth of experience in civilian and military life. Most of them are registered civil engineers.

They have an unusual background not only in engineering and construction, but in the many problems of planning for the design, construction and maintenance of the vast naval shore establishment.

They are particularly well qualified for positions with cities and towns as Director of Public Works, City Engineer, etc. They would be most helpful to States which have—or want to set up—industry-attraction programs. They have broad experience in maintenance, highway work, civil defense, administration and management.

We are taking this means of calling to your readers' attention the qualifications of these outstanding men in order that they will know of their availability in the next few months. I will appreciate the opportunity of recommending some of our officers for their consideration.

E. J. PELTIER
Rear Admiral, CEC, USN
Chief of Civil Engineers
Department of the Navy
Washington 25, D.C.

• *If any of our readers are looking for good men having the experience described in Admiral Peltier's letter, they may contact the Admiral at the above address.*
—The Editors

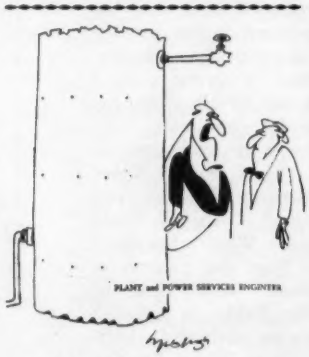
Milk of human kindness

In regards to your cartoon on page 42, September issue, no one has ever induced a dairy goat to eat tin cans or trash.

I can forgive the cartoonist for not knowing this. But noticing that he has equipped the other mammals in the cartoon with the correct number of arms, legs, etc., I thought that he would like to know that goats only have two teats.

L. BERT NYE, JR.
McLean, Va.

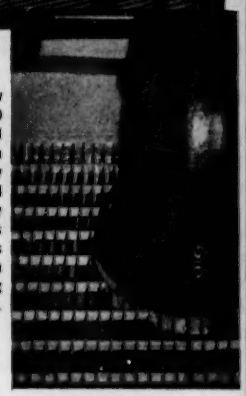
• *The above picture, pasted to the postal card on which Mr. Nye wrote us, has stamp cancellation markings on it, but it makes the point clear.*
Our cartoonist is edified.
—The Editors



"The top's corrosion . . . the bottom's mice."

• *Avoiding controversy, we show no mice in this cartoon.*
—The Editors

PRECISION AND SKILL



★ Close-up view of an IRVICO pressure-locked aluminum grating carefully engineered to fit precisely around pipes and valves in a modern water-pumping station. ★ ★

GO INTO A GOOD GRATING

When you specify IRVICO grating, you receive the benefit of engineering and manufacturing skill developed during more than 57 years of experience in the production of grating. Each IRVICO order is given careful engineering attention. Experienced shop craftsmen execute your order with finesse, and our inspectors permit no grating to be shipped unless it meets your specifications and our high standards. This insures high quality grating, an excellent fit, and no extra installation costs. Catalog on request

IRVICO

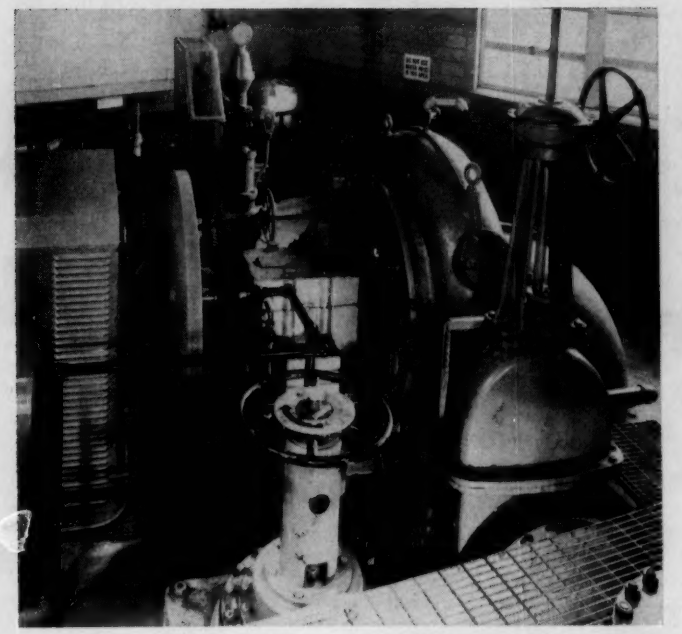
IRVING SUBWAY GRATING CO., Inc.
Originators of The Grating Industry Est. 1902
Offices and Plants at:
5028 27th St., LONG ISLAND CITY 1, N.Y.
1828 10th St., OAKLAND 20, CALIFORNIA

Circle 9768 inside back cover.

DECEMBER, 1959
VOL. 1 NO. 8
Plant Power Services Engineer

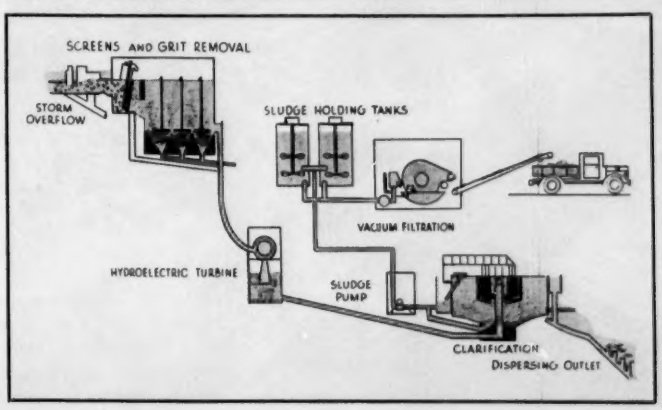
Waste plant produces its own electricity — and then some!

Hydrogenerator on flow of waste water to Eastman Kodak's treatment plant not only produces electricity but also cuts down high energy head and prevents foaming prior to treatment



Waste water, dropping 120 ft to treatment plant, turns generator to produce all electricity for running treatment plant

FLOW DIAGRAM OF KODAK'S WASTE TREATMENT PLANT



At the Kodak Park Works plant of Eastman Kodak Company in Rochester, N.Y., (having more than 120 major buildings located on a 1000-acre site), the flow of waste water is being used to generate electricity.

In the manufacture of its primary products, photographic paper, film, and chemicals, Kodak Park uses an average of more than 20 million gallons of water per day. To meet this unusually high water requirement, Kodak Park taps Lake Ontario, only six miles north of the plant. Underground are two concrete storage tanks holding nearly 10 million gallons for possible emergency use.

After the water has been used in connection with the various processes, it heads for the waste water treatment plant just east of Kodak Park and on the banks of the Genesee River. From the top of the river bank, the waste water quickly drops 120 feet through a pipeline to the treatment plant. At this point, the water pressure is 55 psig.

Here, the water goes through a hydrogenerator which accomplishes several important objectives. The unit removes the high head energy from the water and helps to prevent foaming preparatory to putting the water through the treatment plant to remove the suspended solids. In addition, through the use of a generator (475 kw at 460 volts), the over-all electrical output—over a period of time—exceeds the requirements of the treatment plant.

The surplus power is transmitted back to the Kodak Park electrical system for general use.

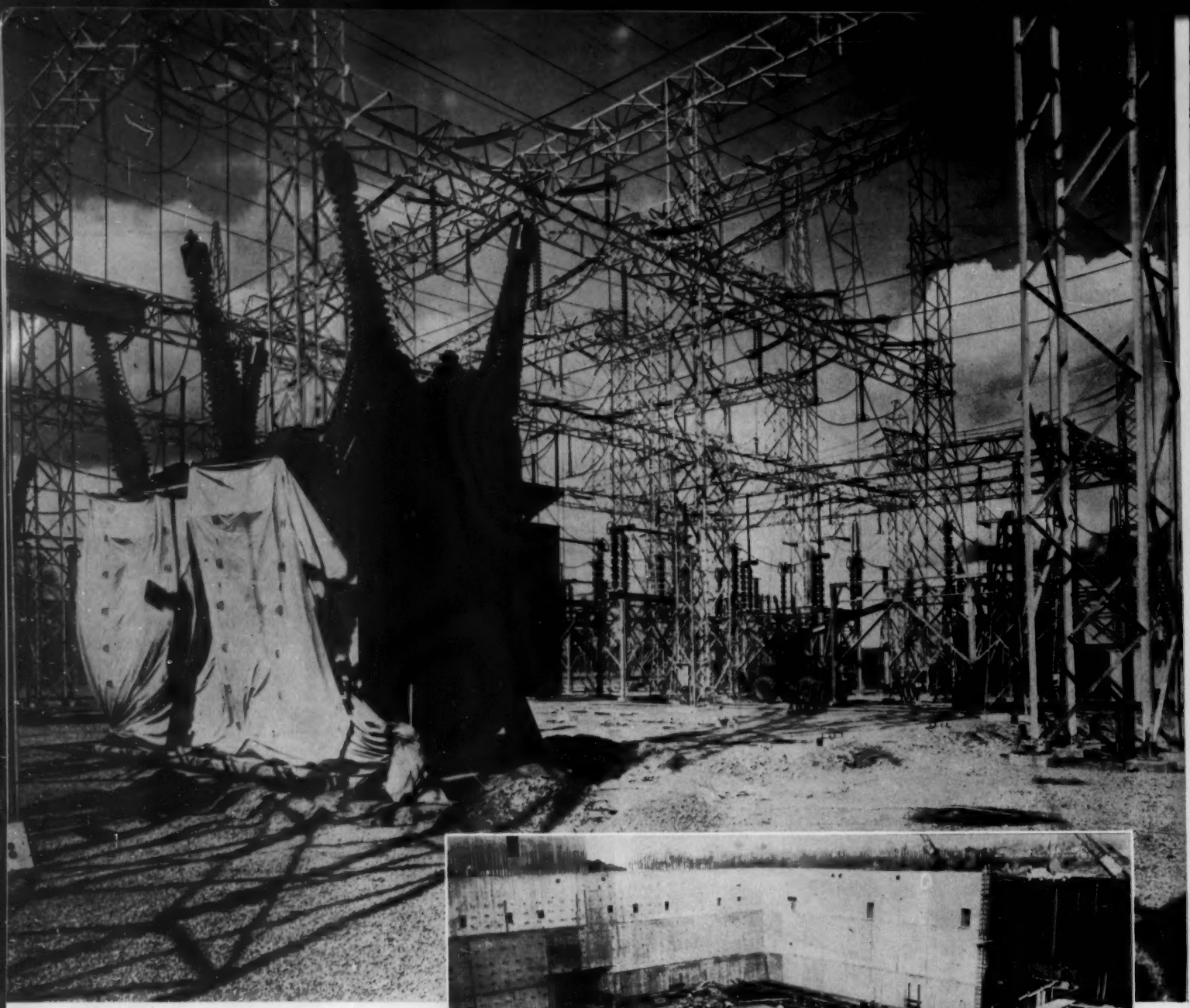
Thousands of dollars annually have been saved in electricity costs since the plant began operation in 1957. Still another function of the hydrogenerator is maintaining automatically a constant level in the grit removal chamber at the entrance to the penstock. This is done by a float in the grit chamber Selsyn motor control to the turbine gates.

The hydrogenerator requires no operators in attendance and almost no maintenance. The unit is specially designed to handle waste water, including the use of special metals to minimize corrosion and erosion.

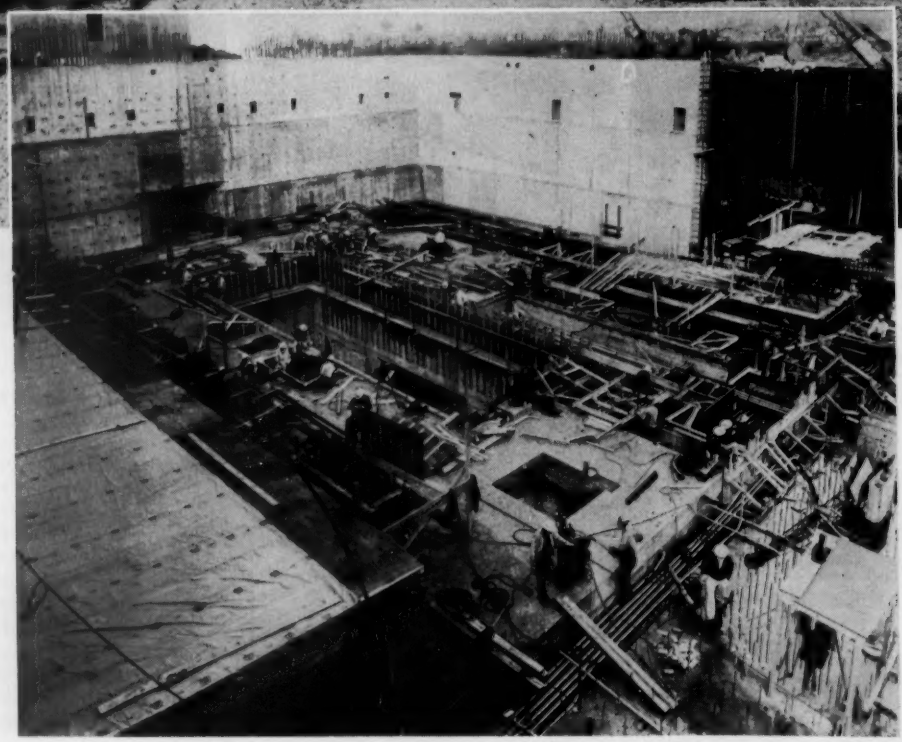
At the present rate of waste water flow (20 million gallons per day), the hydrogenerator makes between 200 to 250 kw. The turbine will handle a maximum of 45 million gallons of water daily. This of course would result in an even greater production of electricity.

After the water is treated and the solids removed, it flows into the Genesee River. The solids are automatically made into "cakes" on large revolving vacuum drums for subsequent disposition.

(Generator is product of Elliott Company, Dept. P&P-SE, Jeannette, Pa.)
Circle 9769 inside back cover.



▲ Vinyl-coated tarpaulin served as shelter during assembly of oil circuit breakers to protect oil from contamination by moisture, dirt and dust



▶ The material was also used in many other jobs such as concrete curing and temporary shelters against the weather

FLAME-PROOF tarpaulin reduces fire hazards during power plant construction

Vinyl-coated nylon fabric is safe to use around sparks and does a multitude of jobs as concrete curing covers, temporary storerooms, and material and equipment shelters

A type of flame-proof, vinyl-coated nylon tarpaulin fabric has proven successful in reducing fire dangers while contributing to safer working conditions. Used for a wide variety of coverings by the American Electric Power System during the past three years on the work sites of two new units (the Breed Plant near Terre Haute, Ind. and the Philip Sporn Plant, Graham Station, W. Va.), the fabric made possible substantial economies in time saved, ease of handling, and low maintenance and replacement requirements.

The fabric combines high tear-strength, great durability, light weight and daylight transmission with fire resistance—so vital in construction work where hot sparks frequently cause loss of life, material, time and money.

A number of the AEP System's contractors suffered from costly fires which occurred on the construction sites when sparks set traditional type covers aflame. In one instance, before the fire could be brought under control, over $20,000 estimated damage took place, not to mention the delay in completing the construction work. By comparison, in those areas where the vinyl-coated coverings were employed, no fires were reported. While an extremely hot spark might melt a hole in it, the fabric is self-extinguishing.

This material was put to many other uses by AEP's contractors. For example, at the Breed Plant, the tear-resistant tarpaulins served as shelters during the assembling of 345kv oil circuit breakers. The completely non-porous fabric, made of a nylon base coated with polyvinyl chloride plastic, protected against the entry of moisture, dirt, and dust which might otherwise have contaminated the oil.

Also at Breed, quickly erected roofs of the fabric were put up over pulverizing pits while workmen installed cork linings. It was necessary to have a waterproof (not just water repellent) covering to prevent cork in the pit from losing its adhesion to the poured concrete. The temporary covers saved the time and expense of carpentry work necessary to build a wooden roof.

In another instance at the Breed Plant, tarpaulin covers were used while applying internal coatings of epoxy resin to condensers. During the dead of winter, with temperatures as low as 10°, the inside of condensers needed to be heated and dehumidified to help epoxy resin coatings stick to the steel.

The material speeded the job and aided the work by keeping out the weather completely, while effectively retaining the heat. Even in the face of sleet, rain and rugged cold temperatures, the fabrics did not stiffen or crack and remained easy to handle.

Lightweight (only 10 oz per square yard), the tarpaulin can be stored wet or dry in limited space without fear of weakening caused by mildew or rot. They offer excellent resistance to grease and oils and are easy to clean and repair. When punctured, the hole will not spread into a long tear and can be repaired simply on the job in little or no time with a patch kit supplied by the manufacturer.

To help eliminate pilfering losses and as a means of readily identifying the covers, every square yard of fabric was imprinted "POWER COMPANY PROPERTY," by an indelible printing process at the manufacturer's factory. AEP chose bright yellow, easy to distinguish coverings for its purposes from among the six different sun-proof hues available: red, yellow, green, blue, gray and white. After thirty-six months of exposure to all kinds of weather —from scorching sun to freezing cold—the covers have retained their bright appearance.

Windbreakers, building material covers, pit coverings, winter concrete curing covers, temporary storerooms and shelters to serve for short periods instead of erecting costly permanent buildings, etc., are but a few of the innumerable uses found for this fabric at Breed and Philip Sporn plants. In the late stages of the construction, new applications are continually being found for these long-lasting, rot-proof fabrics.

(Information on Herculite 20 Tarpaulin is available from Herculite Protective Fabrics, Dept. P&PSE, 661 Fourth St., Newark 7, N. J.)
Circle 9770 inside back cover.

How Plant and Power Services Are Engineered at Eastman Kodak

A "profile" of Richard L. Young, Eastman's supervisor and coordinator of utilities engineering, reveals some broad areas of responsibility—both for the huge Kodak Park complex and for Eastman's multi-plant operations

A P&PSE Profile by H. A. COUNTRYMAN, Editor

Beginning of a New Series

This story on how Eastman Kodak engineers its plant and power services is the first of a new series that PLANT and POWER SERVICES ENGINEER will be bringing you throughout the next year.

These profiles of readers — describing who they are, their functions, how they operate, what their operation consists of, and many other points of interest — are designed to take you "through that tour of other plants" — so that you can see how the other man handles his job.

In this series, we are going to "profile" readers in various industries — engineers who are responsible for the plant and power services in their installations — and in doing so we are going to bring home the vast responsibilities these men have and how important they are to their company's over-all operation.

ENGINEERING the eleven major plant and power services at Eastman Kodak's huge Kodak Park complex is no small responsibility, as Richard L. Young, supervisor of Eastman's utilities engineering group will tell you. Add to this the engineering of utilities facilities at Eastman's other plants, and you can understand that Dick Young and his group have quite a job.

"Utilities" at Eastman

Although they vary somewhat at the other Eastman plants, the utilities at Kodak Park encompass all the steam, electric, compressed air, refrigeration, distilled water, drinking water, natural gas, nitrogen gas, water treatment, waste disposal, and incineration services. In connection with these services, Dick Young's group designs the distribution systems concerning cable capacity and electric load center units; steam lines to all buildings; return pumps and mains; refrigeration mains for brine and water; underground water mains, including fire protection; compressed air mains; distilled water mains; and, to a limited extent, softened water mains.

Responsibilities of Group

For all of these facilities at Kodak Park and some of Eastman's other plants, Dick Young and his group obtain and coordinate load information from the process engineering areas.

They then anticipate the size and type of additions to utilities capacities to be made and predict when they are to be made. Engineering of these additions to plant include the preparation of economic studies, detailed estimates, preliminary layouts, construction drawings, material lists, specifications for purchase of equipment, bid tabulations, purchase recommendations, and final engineering supervision of field work.

Act as Consultants

In addition, the Eastman utilities engineering group acts as consultants for other engineering areas in their use of plant and power services and in the application of costs for these services to economic studies. They also act as consultants for other engineering areas on all design work that falls specifically within the field of plant and power services or utility engineering. They prepare special material standards for these other areas where those materials specifically fall into utilities engineering. They assist in the preparation of the utilities di-

vision's capital expenditure program. And, finally, upon request, they make special engineering studies for the utilities operating group.

Capacities at Kodak Park

But to really appreciate the scope of the utilities engineering job at Eastman you have to know something about the capacities of the facilities at Kodak Park.

The purely power services alone consist of 16 boilers and 13 turbo-generators, with the auxiliary equipment. Newest of these boilers is the 400,000-lb/hr cyclone-fired boiler operating at 1400 psi, 900°F, that was installed with a turbo-generator in 1956. In addition, there are four 800-psi high pressure boilers and four turbines, two units of which, with a new 13,800-volt distributor system, were started up in 1948.

Besides these five high-pressure boilers there are seven older boilers at the Kodak Park East plant operating at 260 psi, and four at Kodak Park West plant operating at 210 psi.

About 60 percent of the steam turbine horsepower drives electric generators and about 40 percent drives the many compressors in the refrigeration and other plants. Adding up all the utilities division steam drives on major equipment gives a total of about 155,000 horsepower, or 115,000 kw, which is enough to supply over one-third the peak demand for the city of Rochester.

Electrical Distribution

As noted above, the turbo-generators installed in 1948 and later all operate at 13,800 volts. The older AC units generate at 2300 volts. This increase in voltage has permitted a reduction in the amount of copper required in Kodak Park's electrical equipment to about one-sixth. Because of the long underground cables going to outlying plant areas, this saving is especially important. The entire distribution system includes 90 large circuit breakers, 20 miles of underground high voltage cable, 60 miles of underground ducts, and 70 power center substations.

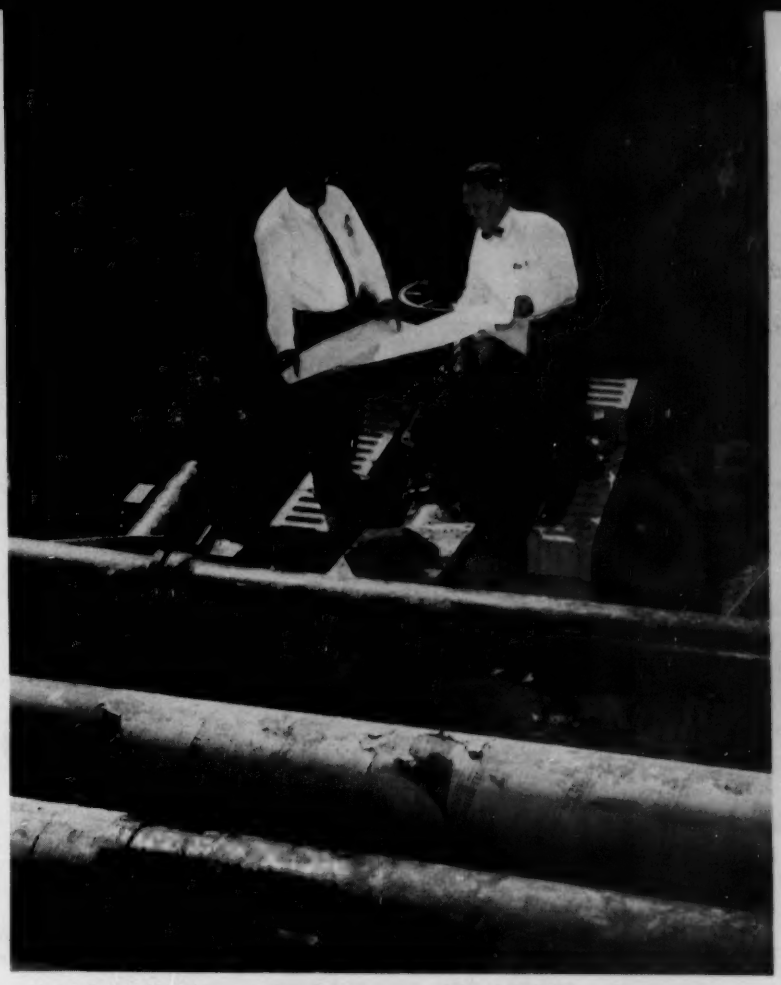
For quite a number of years the electricity rise at Kodak Park has been growing about three times as fast as the steam use. Since most of the electricity is obtained as a by-product of steam delivered to the manufacturing departments, this trend represents quite a serious problem to the Utilities Division and Dick Young and his group.

Refrigeration

Because huge volumes of conditioned air constantly circulate through the many rooms where photographic film and papers are sensitized and processed, Kodak Park's refrigeration requirements are tremendous. According to the best information, the 34,000 tons of refrigeration capacity is the largest in any plant in the world, by quite a large margin. For anyone who thinks of refrigeration in terms of ice cubes, if all this refrigerating capacity was used to make ice cubes, it would, each day, require 700 railroad cars, each holding 50 tons, to haul them away.

A total of 25 large steam- and electric-driven ammonia and Freon machines furnish this refrigeration. The two portions of Kodak Park East have separate 35°F chilled water and 9°F brine systems that are used mainly for process air conditioning.

The other two systems are low-temperature systems used for solvent recovery operations. Prior to 1948, this was handled by a large −36°F system circulating calcium chloride brine. In 1948, a new −85°F system was installed to take over this low-temperature load. This large and unusually low-temperature system, using methylene chloride for circulation, required a considerable amount of original research and engineering. But it has paid off handsomely by greatly improving solvent recoveries.



H. London, field division assistant department head, and R. L. Young discuss a large pipeline extension involving steam, chilled water, compressed air, condensate, distilled water and electricity.

Service extensions as well as plant equipment additions at Kodak Park are subject to careful economic scrutiny to insure best use of the invested dollar. Alternative service sources are carefully weighed. The extensions in this case were not entered on drawings until the following basic points were resolved:

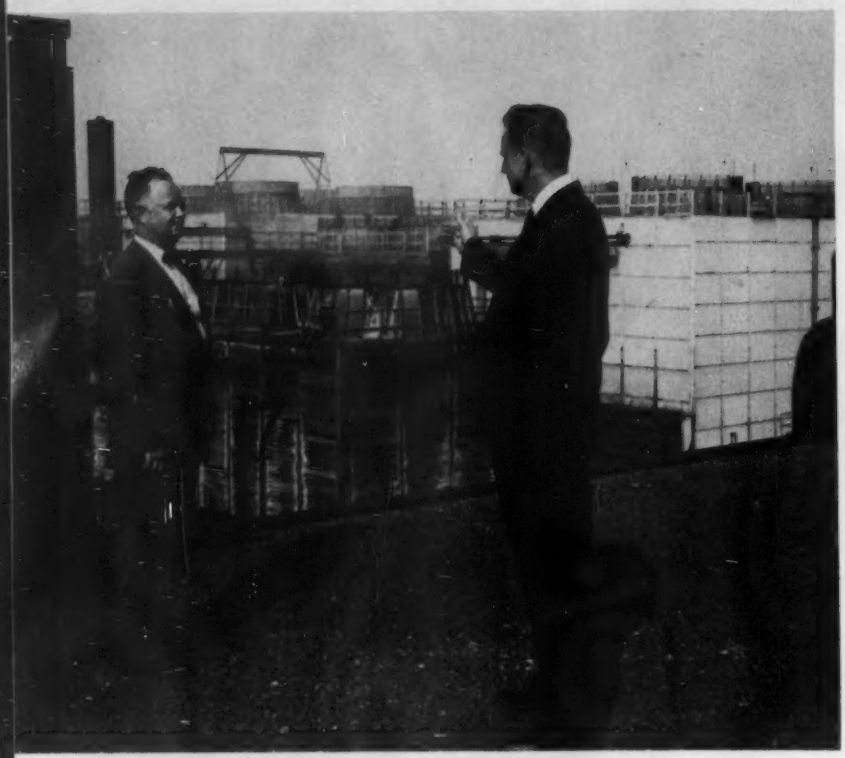
- That steam boilers installed at the site would not be more economical than the steam line
- That the chilled water lines would give better use of the invested dollar than isolated refrigeration units installed at the site
- That electricity purchased directly at the site would not be more economical than electricity supplied through the Kodak Park power system
- That the compressed air line connected to the Kodak Park central system would be economically more desirable than separate air compressors installed at the site
- That the distilled water line connected to Kodak Park central system would give better use of capital than a plan for using tank trucks

Water Supply

Kodak Park's water supply system is unique not so much for the large volume of water as for the unusually strict chemical standards to which it must be treated for use in processing the highly sensitized products.

Water is drawn from Lake Ontario through two intake lines to a filtering plant. Rapid and slow rinse filtration systems have a capacity of 36 mgd in summer and 32 mgd in winter. Two six-mile pipelines bring the treated water from the lake shore to two 5-million-gallon reservoirs at Kodak Park. From these reservoirs six pumping units distribute water throughout the plant.

To next page



Beginning of a project — R. L. Young and E. Johnson, utilities engineering group, talk about a proposed alteration to one of the cooling towers required to service a refrigeration plant having a combined rating of about 34,000 tons. Cooling towers reduce the demand for water from the company-owned water pumping station, located on Lake Ontario, a distance from the plant

Plant and power services facilities for the huge Kodak Park manufacturing complex include 16 boilers, 13 turbo-generators, 34,000 tons of refrigeration capacity, 36 mgd of water supply, and 26 mgd of industrial waste treatment capacity — all engineered by a utilities engineering group under R. L. Young

Utilities Engineering

From preceding page

Distilled Water System

Three sets of four-effect distilled water evaporators supply central distilled water in Kodak Park East. Their capacity of 270,000 gallons in 24 hours is distributed from two storage tanks, one of 20,000 gallon capacity, the other 72,000 gallons. To assure the required purity of less than 1 ppm of solids or gases, all surfaces in contact with the distillate are stainless steel or nickel. The distillate is flashed to remove gases and an ultraviolet light protects the tank vent. An automatic conductivity cell-actuated dump valve diverts any distillate exceeding certain close limits.

Compressed Air

Total installed compressed air capacity is 16,820 cfm of free air, supplied by eight compressors, five steam-driven and three electric-driven. Daily loads distributed throughout Kodak Park average about 10,000 cubic feet of free air per minute.

Industrial Waste Disposal

With over 30 mgd of water being used, the treatment of industrial waste water at community relations conscious Kodak Park is no small operation. An industrial sewage

These Are Typical Projects Handled by the Utilities Engineering Group

——Convert eleven 60,000-lb/hr boilers from coal to natural gas and oil firing

——Reconvert these eleven boilers back to coal

——Installation of four 200,000-lb/hr, 800-psi boilers, with two 5000-kw turbines and two 7500-kw turbines

——Installation of refrigeration plant consisting of 250-ton unit, 26°F brine, 400 hp. First unit of this size to be operated unattended

——At Texas Eastman, Longview, Texas — consultation on an extensive compressor installation

——At Kodak Park, installation of 400,000 lb/hr, 1400 psig, 900°F, cyclone-fired boiler, with 7500-kw turbo-generator

——Installation of 1200-ton, 9°F brine refrigeration unit, driven by condensing turbine drive

——At Tennessee Eastman — installation of 340,000 lb/hr, 1400 psig, 900°F spreader stoker-fired boiler, 7500-kw turbo-generator

——At Kodak Park, installation of 350 ton, −85°F refrigeration unit, with motor drive

treatment plant of 30 mgd capacity is located on the bank of the Genesee River. It contains two 130-ft diameter clariflocculator tanks, and three 500-sq ft rotary vacuum drum filters. A 500-hp water wheel coupled to an electric generator lowers the waste water to the tanks without entraining air, and also generates electric power for the treatment plant, with some to spare for Kodak Park (see story, page 13).

Nitrogen Gas Distribution

Nitrogen is stored at low temperature in an 86,000-cu ft insulated sphere and distributed as a gas through a piping system in Kodak Park East.

Refuse Incinerator

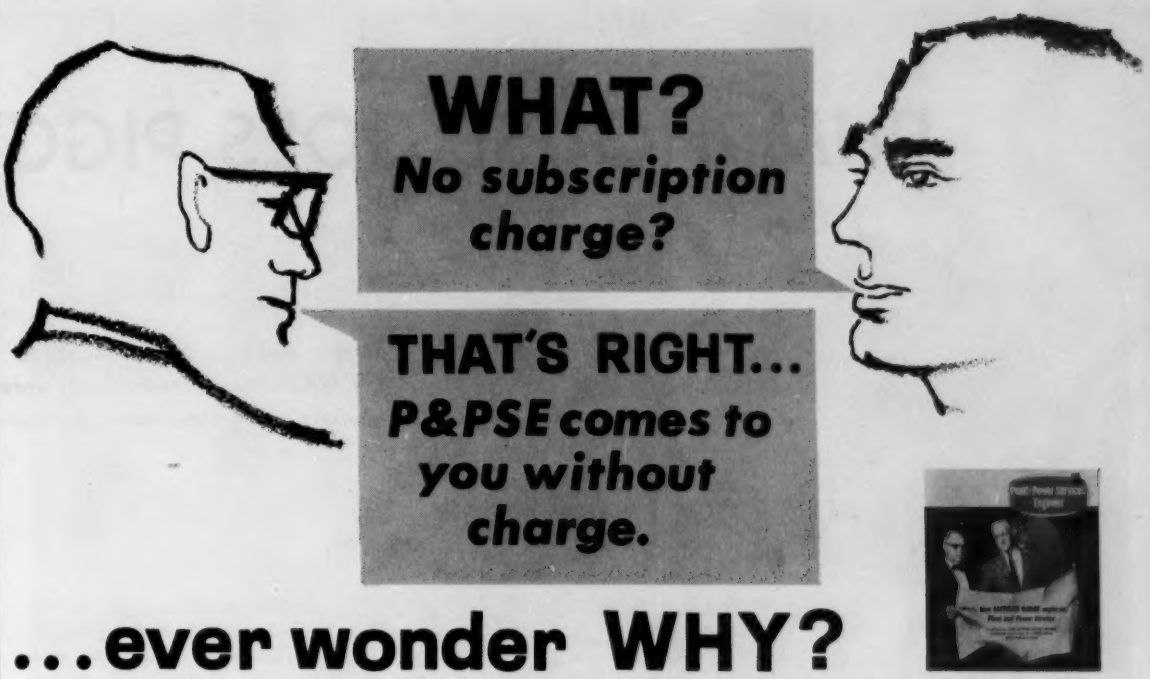
Combustible refuse is collected and dumped into a large pit from which a grab bucket feeds it into an incinerator with a capacity of 80 tons per day.

About R. L. Young

What of the man who heads up the engineering of all these plant and power services? Richard L. Young is a graduate of the University of Missouri, with a major in electrical engineering. He has a Masters Degree from Virginia Polytechnic Institute in mechanical engineering.

After graduation from VPI in 1936, Dick Young joined Eastman Kodak in Rochester. From 1936 to 1956 he was a member of the Utilities Division at Kodak Park serving as test engineer, development engineer, project engineer, and as a supervisor of steam-refrigeration development. In this period, he was on leave to serve as a major in the Army from 1942 to 1945. Since 1956, he has been supervisor and coordinator of utilities engineering.

Beside his association with Eastman Kodak, he has served as an instructor at Rochester Institute of Technology, as Research Fellow (fuel and power) at Virginia Polytechnic Institute and as a research laboratory assistant at the University of Missouri. ■



. . . ever wonder WHY?

Maybe, like many others, you've wondered why PLANT and POWER SERVICES ENGINEER comes to you without charge — while, perhaps, you pay a subscription price for other business magazines.

Maybe, you've thought publishers make money when they sell you a $5.00 or a $10.00 subscription.

NO —

Publishers lose money . . . yes, most business magazines lose money when they sell a subscription — not only because the magazine costs more to produce than the subscription price brings in — but also because the cost of making such sales exceeds the income from $5.00 or $10.00 subscriptions.

ADVERTISERS PAY THE BILLS

You see, it's the money that comes from advertising that keeps the business magazine publisher in business. So, logically, such advertisers demand best possible coverage of folks like you — the important key engineers who exercise buying power in regards to plant and power services products.

SO —

PLANT and POWER SERVICES ENGINEER "hand-picks" best readers . . . and sends the magazine to these key engineers, without charge.

For publishers can't get maximum coverage of these important engineers by trying to sell subscriptions. These men, limited in number, are scattered all over the U.S.A. Travel and/or direct mail efforts cost money. A large share "forget to renew" each year. And, no matter how much time, money and pressure publishers would put on them, there are always some important men who will never buy.

PLANT and POWER SERVICES ENGINEER GETS THE BEST CIRCULATION.

As you can see, to get the best, most effective circulation coverage, the best way is to "hand-pick" the right readers, then send the magazine to them. In this way, we can direct our editorial efforts solely and completely to serving this "hand-picked" audience.

This, too, gives advertisers maximum value — value that can't be obtained in any other way.

THAT'S WHY —

PLANT and POWER SERVICES ENGINEER "hand-picks" only qualified readers . . . the key engineers responsible for plant and power services in all kinds of industry, in utilities, in large public and private institutions, and in consulting capacities. Then, the editors make the magazine so interesting, so valuable, these men want to read it.

That's why PLANT and POWER SERVICES ENGINEER spends many thousands of dollars on each issue — to give you this valuable service.

That's why PLANT and POWER SERVICES ENGINEER comes to you without charge.

a ***READER-ACTION*** *magazine*

Plant Power Services Engineer

published monthly by
PUTMAN PUBLISHING COMPANY
111 E. Delaware Place, Chicago 11, Illinois

publishers of CHEMICAL PROCESSING, FOOD PROCESSING, FOOD BUSINESS, PLANT and POWER SERVICES ENGINEER

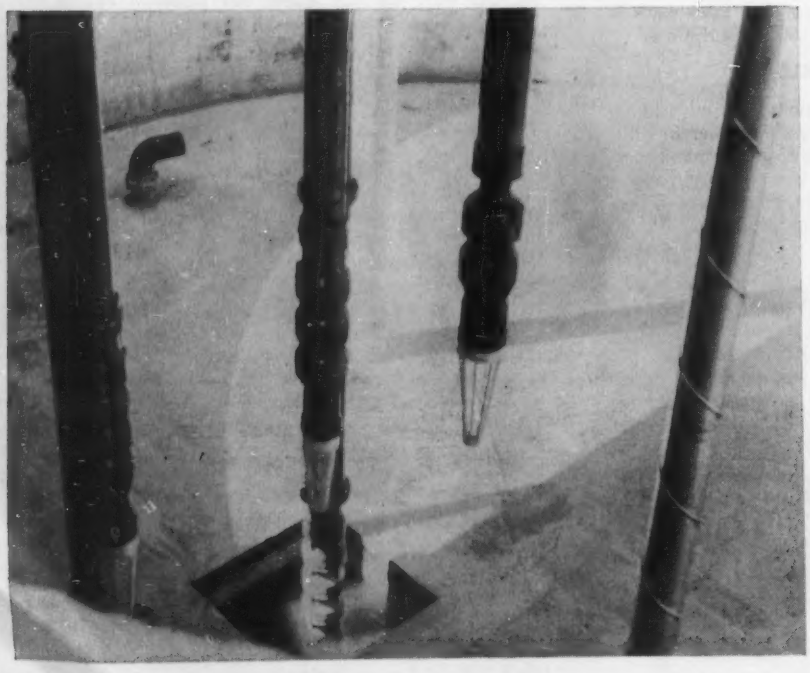
PUMPHOUSE GOES PIGGYBACK

Paper mill adds 300,000 gallons to fire protection and process water supply, using "unusable" plant property

THOMAS G. GRESSETT
and V. A. VASEEN
Ripple & Howe, Inc.
Denver, Colorado

The Denver mill of Central Fibre Products Company recently solved two major problems of water supply with a unique, but economical storage system. Pressure and capacity of the plant fire protection system was so inadequate that higher fire insurance rates were being asked. Continually increasing process water demands were a potential limitation on paper production.

Existing plant water system was composed of four wells serving a 100-ft high, 50,000-gallon overhead storage tank. Wells were equipped with vertical turbine pumps operating on continuous duty. The fire protection system was integrally connected with the process water system, which gave a 100 ft maximum head for fire protection pressure.



Length of shafts on process water pumps is held to 10 ft to reserve remaining 10 ft of water in storage tanks for fire protection

First approach to the problem was to separate the process water system and the fire protection system. A water storage tank was a virtual necessity in accomplishing this "separation" since it would allow a storage capacity for peak load demands of process water, plus a peak demand storage capacity for the fire protection system. The overall plan called for a concrete tank that would provide some four hours of process water storage and 150,000 gallons of fire protection storage.

Picking a location for this tank presented some problems. Several acres of company-owned ground were available but were subject to ground water and occasional flooding. Higher ground was also available but was more valuable in terms of potential plant expansion, and as storage space for baled waste paper.

A storage tank located on the lower ground area however, meant that the pump house and new high pressure pumps would be located in a potential flood area. At the suggestion of the plant engineering department, utilization of the lower, but less valuable, land was investigated by considering the possibility of locating the pump house on top of the tank. This approach allowed protection for the water supply pumps during possible flood conditions.

Studies showed that a very good tank height vs diameter design, for minimum tank construction cost, occurred at 20 ft. high and 50 ft. diameter for 300,000 gallon storage. Cost of reinforcing steel and concrete required in the tank walls and footings to carry the pump house weight was not unreasonable.

But, the fact—that the height of 20 ft. was exactly the requirement to avoid flooding of the tank or pump house—was one of the most important factors in locating the pumphouse on top of the tank.

With the tank location settled and the pump house structure located on top of the tank, vertical pumps were selected for high pressure water supply to the process system as well as for the high pressure water supply fire protection.

The overall system was planned to use the new storage tank to offset peak load demands for the plant process water and allow an additional

150,000 gallons minimum for fire protection in the tank. The existing wells were re-piped to tne new storage tank. Since these wells were operating with vertical turbine pumps, one or two bowls were removed as required from each pump so that the new lower head could be utilized without overdrawing the wells on maximum demand.

Two new wells had been previously drilled on company property. Piping the water from these wells to the new tank gave a maximum available supply of 2200 gallons per min and a peak demand storage of 150,000 gallons, or 1½ hours process water storage at the tank in case of trouble at any or all of the well pumps.

The existing process water line to the plant was disconnected from the existing overhead storage tank, and connected to three new high pressure vertical turbine pumps operating in parallel in the pump house. Starting and stopping of these pumps is based upon the pressure maintained in the discharge line of the process pump manifold. To avoid serious variations in process line pressure when demand does not exactly match pump capacity, a by-pass valve on the pump manifold will automatically open so plant water pressure can remain constant at all times. The by-pass valve discharges back into the tank.

The process pumps are limited in the amount of water taken from the storage tank by the simple expediency of using a 10-ft long vertical turbine-pump shaft. This allows the remaining 10 ft of water depth in the tank to be reserved exclusively for fire protection.

The fire protection system now consists of a new 1000 gpm, 100 psi vertical turbine fire pump in the pump house over the storage tank, with direct piping to the existing fire system loop around the building and to the overhead sprinkler system.

The existing 50,000 gallon overhead storage tank is now used exclusively for fire protection emergency stand-by. If the high pressure fire pump were to fail, the 50,000 gallon storage tank would supply 100 ft of pressure head to the existing automatic sprinkler system as immediate emergency stand-by.

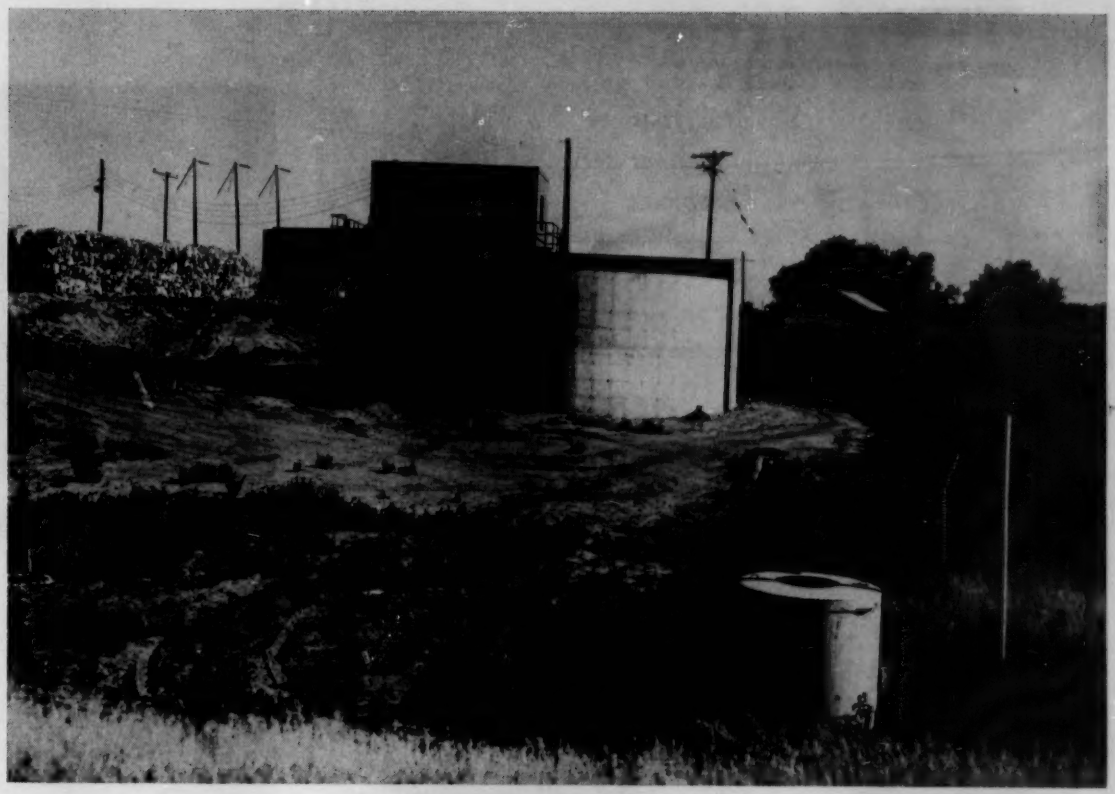
Directly beneath the existing overhead storage tank is a pit which contained all the old well piping. This pit has been completely rejuvenated and now serves as housing for a stream-water heat exchanger which maintains 40°F water temperature in the overhead tank in below freezing weather.

The well pumps are controlled by telemetering equipment centrally located in the pump house.

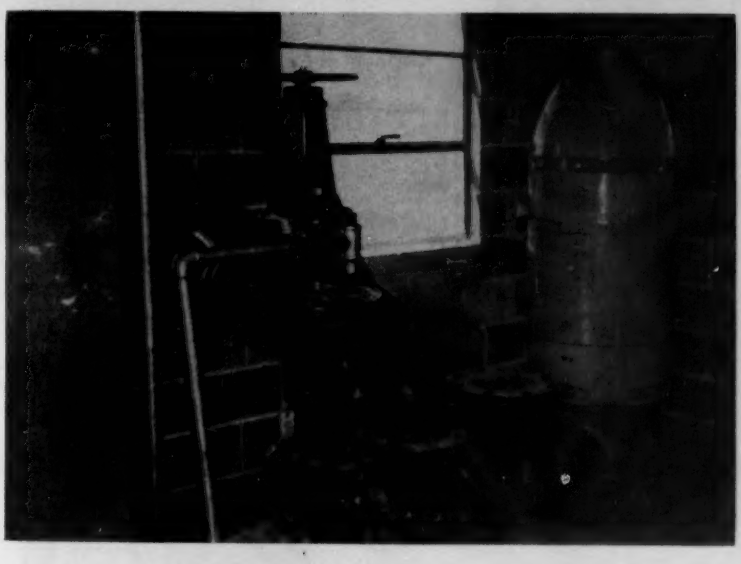
All of the telemetering cables and electric power wiring to the well pumps were installed underground with the low-cost Transite water supply mains.

The 300,000 gallon installation gives the mill a new fire protection supply system and an expanded process water supply system to match expected 10-year growth, while utilizing what was otherwise considered some almost unusable land for water storage.

END



Mounting pumphouse on top of new water storage tank permits locating tank on plant grounds subject to ground water and flooding



New 1000 gpm, 100 psi vertical turbine fire pump installed in pumphouse over storage tank

NEW SOLUTIONS

for your plant and power services problems

Gets easy, quick make and break with this pipe coupling

Cape Canaveral air compressor systems require easy maintenance

The air compressor systems at Cape Canaveral require a coupling connection that would provide "quick break-away" for easy maintenance.

Through the use of a special coupling, assembly and disassembly are accomplished in a matter of minutes. In addition, the use of the coupling provides ease of installation in the close quarter connection of an air delivery line in the tunnel of Launch Pad No. 2 to the line going to the surface of the Pad.

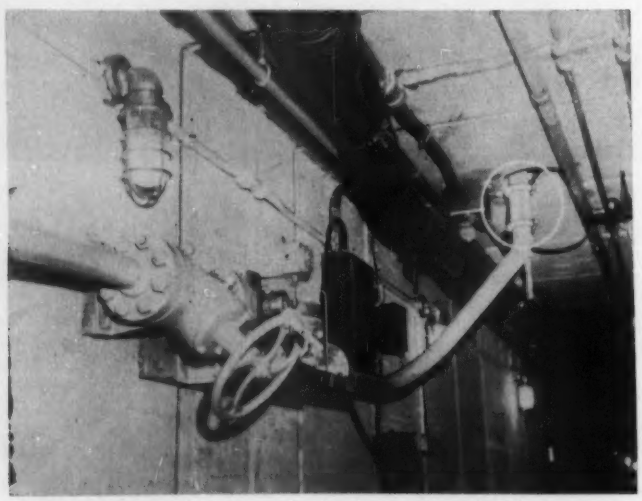
The streamlined coupling is rugged and corrosion resistant. Only two nuts and bolts on the hinged-coupling ends allow ease and speed of assembly.

Also, the coupling allows up to 5° angular misalignment when joining pipe and permits both angular and axial pipe movement without leakage.

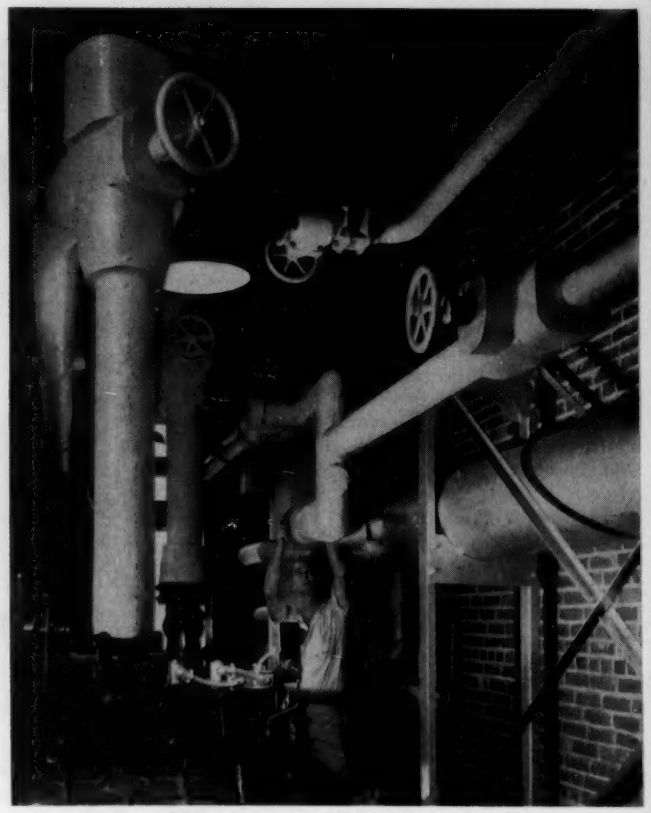
Pipe vibration and shock are absorbed by a gasket in the coupling design. The fitting consists of seven components and assemblies to form a light-weight, reuseable unit suited to all kinds of air lines, hot water lines and lube oil systems.

("Flexmaster" Pipe Coupling is product of Marman Division, Aeroquip Corporation, Dept. P&PSE, 11214 Exposition Blvd., Los Angeles 64, Calif.)

Circle 9771 inside back cover.



Besides easy make and break, coupling handles angular and axial misalignment



A flexible foamed-plastic insulation which easily slips on piping was used to prevent condensation on refrigerant lines, 3 inches and under. A foamed-plastic board was used on larger lines, tanks, and freezer room itself

Foamed-plastic insulation does job when it's hot & humid outside freezer

Material is flexible

Severe heat and humidity were two of the conditions the Richardson & Robbins Company of Dover, Del., had to overcome when it constructed a freezer room to add frozen poultry to its line of canned products.

During the summer, the temperature and humidity average well above the normal in the Dover area. Lines carrying refrigerant as low as −45°F are exposed to these conditions.

To give best insulating job and prevent condensation, a flexible foamed-plastic insulation was used on the cold lines, and a foamed-plastic insulation board was used for the walls, ceiling and floor of the freezer room itself and the anteroom in front.

No condensation has formed since the freezer room went into operation late this summer.

The three-inch and smaller lines were insulated with the

flexible pipe covering which can be slipped over piping, or slit longitudinally, snapped over and then sealed.

Larger lines and tanks were covered with two layers of ¾" plastic sheet, held in place and sealed at the joints and seams with a waterproof adhesive. This same procedure was used on the large square flanges which would have posed a problem with the use of a non-flexible material.

Since the material has a built-in vapor barrier, no additional finishing was needed after the material was installed and the seams sealed.

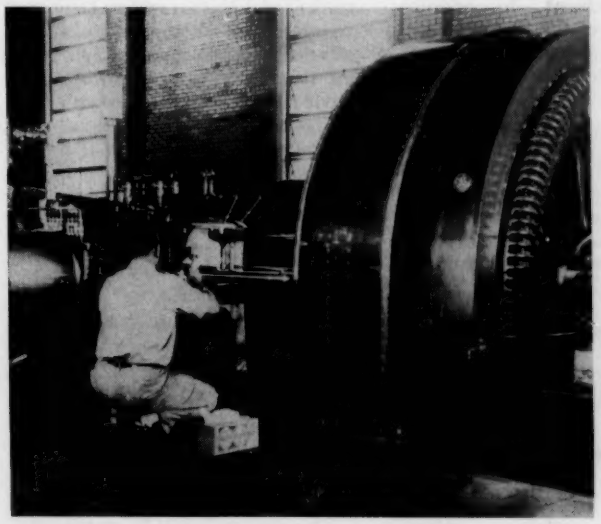
The material itself is self-extinguishing and, in addition to its built-in vapor barrier, it has a high insulating efficiency. It is both flexible and resilient and is easy to work with. It doesn't rub off, chip or crumble, and difficult fittings such as valves are easily mitered.

The freezer room outside walls were insulated with 9" board and the floor and ceiling were insulated with 10" material. The plastic board was covered with two coats of a trowelled-on, two-part material mixed with white coal storage room finish.

The material is structurally stable, and will not swell, warp or buckle. Its thermal conductivity is 0.24 Btu/sq-in, °F, hr at 70°F mean temperature.

("Armaflex" flexible foamed plastic insulation is product of Armstrong Cork Company, Dept. P&PSE, Lancaster, Pa.)
Circle 9772 inside back cover.

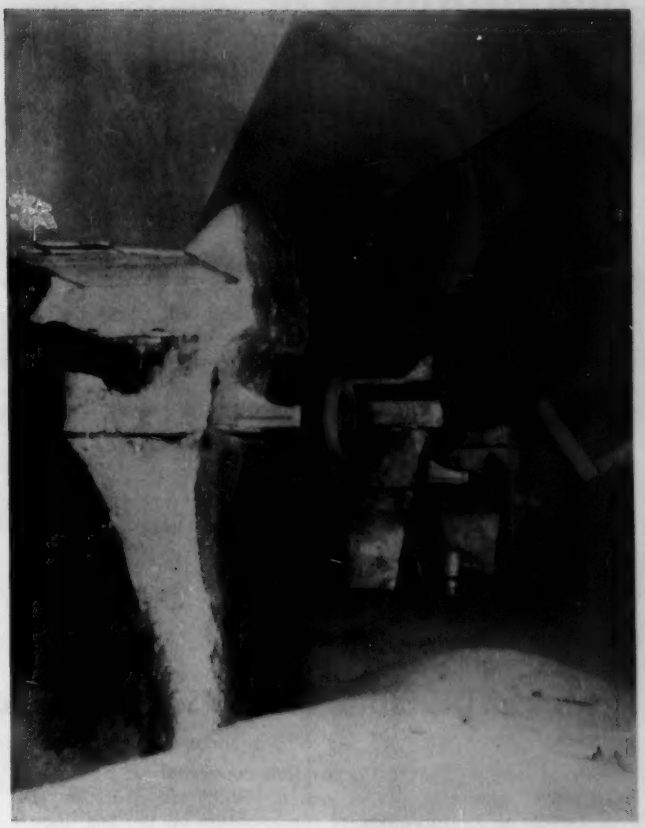
("Armalite" foamed-plastic insulating board is manufactured by Armstrong Cork Company, Dept. P&PSE, Lancaster, Pa.)
Circle 9773 inside back cover.



Spent grease . . .

. . . is removed quickly and efficiently from the eccentric of a Skinner Uniflow engine with disposable paper wipers at the U.S. Tobacco Co. power plant in Richmond, Va. Grease is wiped from the eccentric at least once every eight hours to prevent it from dripping onto floor and causing a hazard. Excess grease is absorbed in the tough, two-ply wipers which are discarded and subsequently burned.

(Disposable paper wipers are product of Scott Paper Company, Dept. P&PSE, Chester, Pa.)
Check 9862 on Reader Service Card.



Three of the eight single roll ash crushers operating continuously at Hickling Station to stop plugging in hoppers

Continuous crushing stops ash plug-up, reduces maintenance

When Hickling Station of New York State Electric and Gas Corp. changed from No. 4 Buckwheat anthracite to lower-cost bituminous coal a new problem arose in ash handling.

Use of the lower ash fusion fuel resulted in some slag build-up in the superheater. Soot blowers dislodged this material, causing it to fall into the cinder return hoppers. Each of the eight hoppers originally fed into 4-inch diameter pipe which returned the ash for reburning. Anthracite ash caused very little trouble, but the bituminous ash chunks are exceptionally large. Daily maintenance schedules had to be set up to clear out the plugged hoppers.

A solution was found with the installation of a single-roll crusher in the bottom of each hopper. Operating 24 hours a day in temperatures between 400 and 450°F, these crushers continually grind the ash chunks while turning at 75 rpm. Since installation of the crushers, daily maintenance operations, requiring dis-assembly of the piping, blowing out with air and rodding, are now unnecessary.

(Single roll crusher is product of Sprout-Waldron & Company, Inc., Dept. P&PSE, Muncy, Pa.)
Circle 9774 inside back cover.

Grease withstands high-temperature beating and saves $67 a week

Stubnitz Greene Corp., manufacturer of auto seat springs, was plagued by constant failure of oven conveyor trolleys. Continuous shutdowns, work stoppages and the ruining of several large bearings were due to the short-lived organic lubricant the Adrian, Mich., firm used.

When the company switched to a silicone grease, it found that everything ran smoothly and re-applications were needed only once a week, despite the fact that the oven temperature ranged around 475°F and each of the bearings was on a 20-minutes-in, 20-minutes-out schedule.

During the 10 years that Stubnitz Greene has used the grease, they figure they have saved at least $67.00 per week in lubricant costs alone.

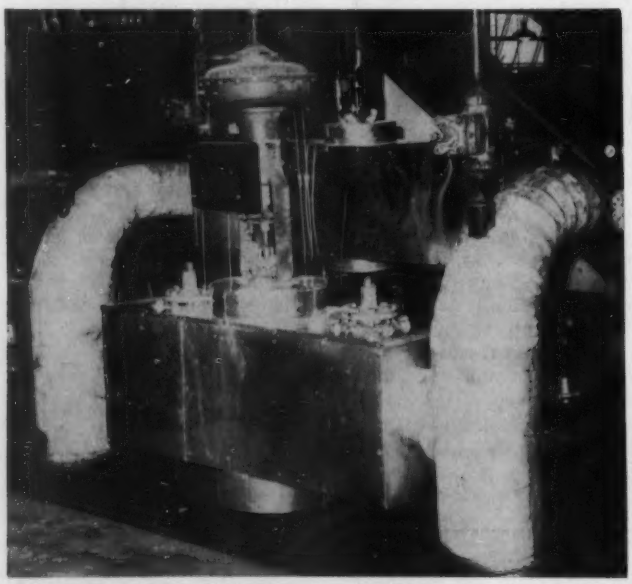
(Dow Corning 41 Grease is product of Dow Corning Corporation, Dept. P&PSE, Midland, Mich.)
Circle 9775 inside back cover.

Grease withstands 475°F oven temperature and protects trolley bearings

Prevents pipeline condensation at half the insulation thickness

When Florida Power Corporation converted its St. Petersburg power plant to natural gas, it sought an insulation that would prevent the formation of condensation on the gas lines.

The temperature of the natural gas flowing through the pipe lines is almost always lower than the dew point of the surrounding air. The gas lines and associated fittings had to be insulated to prevent "sweating" from a 32°F ambient. In addition, since all of the insulated surfaces are covered with aluminum, a rigid and dimensionally stable insulation was preferred.



Although rigid pre-molded polyurethane insulation was used on lines and fittings, a liquid polyurethane material was cast around valves. The material, poured in place inside an aluminum mold, foams to form insulation. The aluminum mold is left to act as a finish covering

These requirements were met at high thermal efficiency and low cost by two forms of a polyurethane foam material. The cost of the material is competitive with insulations of comparable efficiency. However, because of the material's low K-factor — 0.08 Btu per sq ft, °F at a mean temperature of −100°F — substantially reduced thicknesses can be used.

This permits savings in application time and in the quantity of finishing materials required.

One type of insulation was a pre-molded polyurethane pipe insulation, applied to all lines. Installation did not require special tools.

For straight sections of pipe, molded half-sections, three-feet long, were specified. On elbows and other fittings, the molded half-sections were cut to fit. A one-inch thickness of the rigid material was used throughout.

Joints were pointed with a sealer, and the insulation covered with aluminum jacketing. The material has a 3 lb/cu ft density and is strong, having a compressive strength of 50 psi at 75°F, a flexural strength of 103 psi and a tensile strength of 60 psi.

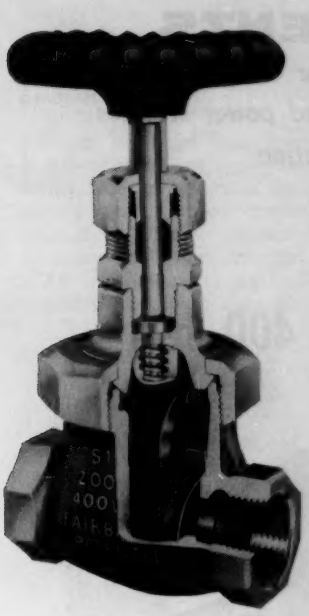
The other polyurethane material — a liquid which is foamed in place — was cast around valves. First, an aluminum box was built around the valve. The material was then poured through the top of the box and allowed to foam.

After curing, the top of the insulation was trimmed and an aluminum cover installed. In this way, the aluminum box serves both as a mold and as a finish covering.

("Gem-Foam" and "Gemfil" polyurethane foam insulations are products of Baldwin-Ehret-Hill, Inc., Dept. P&PSE, Trenton, N. J.)
Circle 9776 inside back cover.

(Sealer used on joints is No. 30-46 insulation sealer manufactured by Benjamin Foster Company, Dept. P&PSE, 4635 W. Girard Ave., Philadelphia 31, Pa.)
Circle 9777 inside back cover.

If and when it becomes necessary to replace seat ring and wedge, it is a job that can be done in a matter of minutes

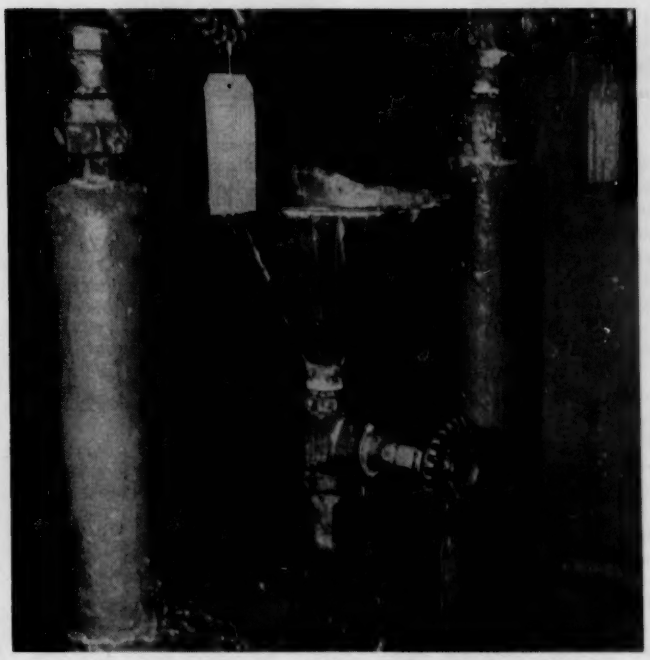


Bronze valves withstand water treatment chemicals

Seat rings can be easily replaced if necessary

At the Torrington Co., Torrington, Conn., it was necessary to replace valves used on chemical feed connections of a boiler feed pump within a two-year period, as the chemical treatment material would so deteriorate the seats and wedge of the valves that they would cease to hold tight.

To replace the valve, it was at least a half-a-day job for two men. The job required not only the replacement of the valves, but also the cutting of new nipples and the replacement of insulation on the lines.



Three 1½ inch gate valves have held up three years against abuse from water treatment chemicals

Bronze gate valves, featuring a renewable seat ring, were installed. Three 1½" valves were placed on the connections, where soda ash and chemicals are fed into the system at least twice a day.

The valves are subjected to a working pressure of 140 psi. These valves with nickel alloy wedge and seat rings have been on the system for over three years.

It is an easy job, if and when it becomes necessary to replace the seat rings and wedges. All that has to be done is to remove the bonnet from the valve body and loosen the retaining screw on the seat ring with an ordinary screwdriver.

When loosened, the ring can be removed and replaced with a new one by hand. The screw is then tightened, and the bonnet replaced.

The job can be done in just a matter of minutes.

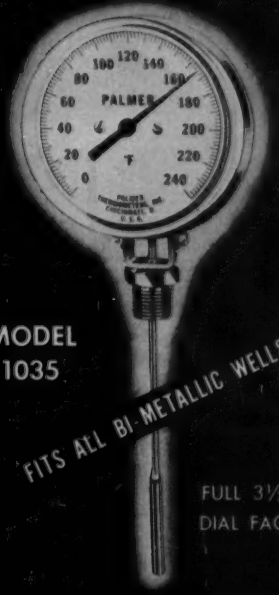
(Renewable Seat Ring Bronze Gate Valves are manufactured by The Fairbanks Company, Dept. P&PSE, 393 Lafayette St., New York 3, N. Y.)

Circle 9778 inside back cover.

Outstanding Accuracy

PALMER

Dial Thermometer



Check these functional features

- Direct-drive Bourdon Coil with a filled system for longer lasting accuracy.
- Stem can be placed at any desired angle and case can be rotated to most readable position.
- External calibration for zero setting.
- Unaffected by stem alignment.
- Accurate to one scale division.
- No sticking at any temperature.
- Non-corrosive case.

PALMER

THERMOMETERS, INC.

Mfrs. of Industrial Laboratory, Recording and Dial Thermometers

2515 Norwood Ave., Cincinnati 12, O.

Circle 9779 inside back cover.

NEW DEVELOPMENTS

for

effective plant and power services operation

Measures torque to 400 lb-in

Sensor detects dynamic torque transmitted by shafts rotating at speeds to 24,000 rpm without brush contact with rotating element

Providing adjustable full scale torque, device provides linear deflection to any full scale torque within the range 50 to 100 percent of the sensor maximum torque. This permits smaller torque increments to be observed and good accuracy to be obtained when measuring less than sensor maximum torque.

The sensor detects dynamic torque transmitted by shafts rotating at speeds to 24,000 rpm without brush contact with rotating element. The torque is continuously displayed at the indicator with an accuracy within 2 percent of the selected full scale reading.

Simple adjustment prior to testing assures full compensation for ambient conditions and aging effects. A change in full scale reading is accomplished at the indicator panel without additional calibration.

Interchangeable sensors have maximum torque ratings ranging from 10 to 400 lb-in and are provided with means for mounting to a base and for overhung mountings from the ends.

The compact electrical system requires neither vacuum tubes nor external voltage regulation to achieve portability.

(Torquemeter is product of Rotiform Company, Dept. P&PSE, 1509 Colorado Ave., Santa Monica, Calif.)
Circle 9780 inside back cover.

For more information on items reported in the New Developments section circle corresponding numbers on reader service card inside back cover.

Material deadens vibration, noise

A high-density, low-mass material minimizes undesirable low-frequency sound energies and lowers mechanical vibration motions.

The material is a flexible, vinyl sheet impregnated with metallic lead powder and backed with either woven glass-fiber cloth or cotton duck (or other fabrics if desired). It may also be obtained with a pressure-sensitive adhesive backing, making it easy to apply to metal and other such surfaces.

Some potential applications are: linings for noisy machinery housings, noise suppressor covers for pumps and compressors, and wall panels.

It is manufactured in several different weights and can be obtained in rolls from 1" up to 38" wide. A few narrow strips of tape prove very effective in stopping the vibration energy patterns of a large area of sheet metal.

("Coustifab" is product of Cordo Chemical Corporation, Dept. P&PSE, 34 Smith St., Norwalk, Conn.)
Circle 9781 inside back cover.

Portable heater burns LPG

Portable space heater that burns liquid petroleum gas is suitable for providing heat to keep workers warm in maintenance shops, warehouses, shipping platforms, boiler rooms, and other plant areas. It is also useful in thawing out frozen equipment and materials.

The unit is engineered for quiet, sootless production of high volume heat — 200,000 Btu's. A ⅛-hp motor drives a fan that circulates the warm air at a rate of 2000 cfm.

The standard model includes a burner control that quickly turns off the fuel should the power fail or flow of gas be interrupted.

Weighing 45 lb, it can be carried from one place to another. It quickly connects up to a gas bottle and a 110v AC electrical outlet.

An outer shield acts like a Venturi tube — it sucks cold air in from the floor and mixes it with warm air giving a warm blast.

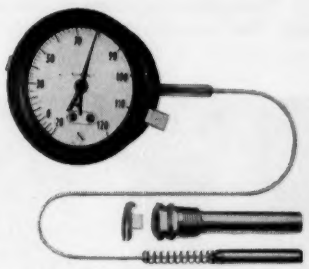
Thermostats can be added where temperature control is desired.

(LPG200 heater is product of Stow Manufacturing Company, Dept. P&PSE, 125 Shear St., Binghamton, N. Y.)
Circle 9782 inside back cover.

For reading temperature in ducts, tanks

Remote-reading, 2½" vapor pressure, actuated-dial thermometer provides accurate and convenient reading of duct temperatures on air conditioning equipment, pumps and oil circulating systems, tanks and any other such applications.

The instrument's spring-clamp bulb and well assembly allows conversion from plain to well-type bulb in a few seconds. The small diameter copper capillary tubing can be positioned out of sight.



Both Fahrenheit and Centigrade dials are available

An adjustable pointer makes recalibration simple and quick. Gaskets keep the thermometer "splash-proof" in wet installations.

Flush-mounted by either front flange or U-clamp, the instruments range from −40/65°F to 260/450°F and 0/100°C to 90/185°C.

(Type 6440 and 6470 Series vapor pressure thermometer is product of Manning, Maxwell & Moore, Inc., Dept. P&PSE, Stratford, Conn.)
Circle 9783 inside back cover.

Monitors hundred temperature points simultaneously

Time lag is nil

Simultaneously monitoring up to 100 temperature points, instrument is so designed that when any one of the temperature points being sensed reaches that indicated on its control dial, an alarm is sounded — and the critical point identified by a numbered light.

Through constant contact, the device minimizes time lag usually encountered in scanning systems.

The readout's audible alarm

Instrument is completely transistorized

may be turned off by a reset button, while the identifying light remains on as long as the temperature point is off-normal.

As each channel operates independently, the unit will continue to sense the other points and will alarm any other off-normal conditions.

The actual temperature of any point may be determined by first depressing the "quiet" button and then manually rotating the appropriate set point dial until the numbered light flashes on.

A small writing area adjacent to each dial enables operator to record the temperature at which the dial was originally set.

The unit provides direct readings on the Fahrenheit scale with accuracy of ±3° F.

The unit is completely transistorized, and interchangeable printed-circuit cards are used throughout.

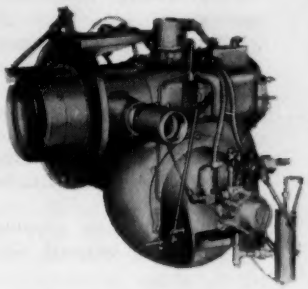
(Simultaneous Temperature Alarm Readout (S-T-A-R) is development of Fischer & Porter Company, Dept. P&PS-E, 303 Jacksonville Rd., Hatboro, Pa.)

Circle 9784 inside back cover.

Inverted forced-draft burners fit Scotch Marine boilers

Available in oil, gas and combination gas-oil units, line of inverted forced-draft power pressure burners are designed for application to Scotch Marine boilers.

Rugged and fully automatic, they incorporate electronic safety and operating controls. Low-fire start on oil and combination units utilizes modulated system in conjunction with variable flow nozzles and is standard on larger units.



Full modulated firing system is standard on larger sizes

Capacities, in appropriate sizes, range from 7 to 30 gph, or gas capacity of one to 4.2 million Btu/hr. Full modulation is standard on larger gas burners.

The high-speed forced-draft fan furnishes all air necessary for combustion against positive combustion-chamber pressures. No stacks or induced draft fans are necessary.

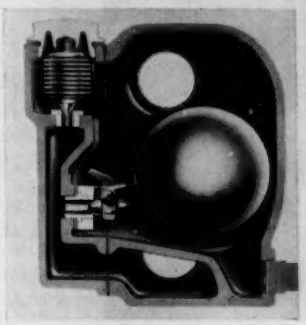
(Type PCPSE burners are manufactured by Ray Oil Burner Co., Dept. P&PSE, 1301 San Jose Ave., San Francisco 12, Calif.)

Circle 9785 inside back cover.

Steam trap parts are easily accessible

Newly designed float lever in line of steam traps provides better balance for more sensitivity and assured precise operation at any pressures from zero to rated capacity.

All working parts are contained in the cover assembly;



All working parts are in head for quick inspection

therefore, it is not necessary to break pipe connections for maintenance work.

Two types are available: Type T with float and thermostat for vacuum and pressure service; and Type M, float only, for pressure service.

The units are available in all sizes up to 125 psi water pressure.

(Steam traps are product of L-R-P, Inc., Dept. P&PSE, 106 Main Street, Leicester, New York.)

Circle 9786 inside back cover.

One way to measure small flow rates of gas, air

A sight feed bubbler featuring a built-in check valve is designed for controlling and visually indicating relatively small rates of flow in gas and air lines. Typical applications include bleeding air into lines to purge them of corrosive fumes or gases, and use with hydrostatic liquid level gages hooked up for continuous gaging.

The entire flow of gas is

To page 30

AIRETROL

automatic tube expansion control

rolls ¼"-1½" O.D. tubes pneumatically faster than you ever thought possible. Average worker easily rolls up to 12 tubes per minute.

Here's why . . .

Operator dials desired torque in ft.-lbs. on micrometer head. Precision torque-sensing mechanism automatically stops expansion at this setting . . . maintains .001" accuracy consistently. Result? More work per man-hour, operator error eliminated. Write for Bulletin No. 64 or plant demonstration.

BRANCH OFFICES: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge. REPRESENTATIVES: in principal cities of U.S.A., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii.
EUROPEAN PLANT: Vlaardingen, The Netherlands
CANADIAN PLANT: Brantford, Ontario

Circle 9787 inside back cover.

Safety, compactness, and ease of

are features of electrical

Bus duct system will be available in ampere ratings of 225 through 1000 amps at voltage ratings through 600v

Joining the bus duct is a simple job with the plug-in design. A minimum number of bolts are required to make the joint secure

Bus plug design allows one man to make plug-in easily and safely. Unit cannot be attached or removed with switch in "on" position or duct plug-in cover open

Featuring plug-in power take-offs at any place along the line without disconnecting the main power line, bus duct electrical distribution system has been designed for top-notch flexibility, ease of installation, economy and safety.

Outstanding features include:

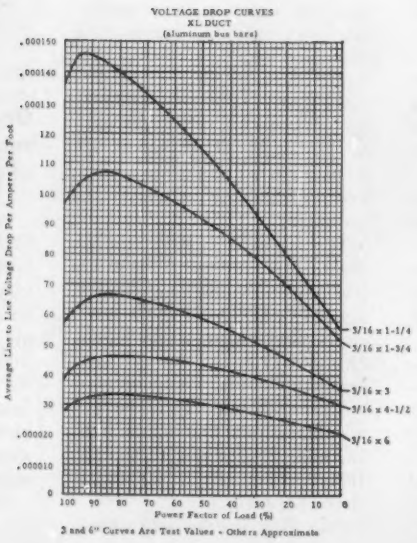
- Operator safety — bus plugs cannot be attached or removed with switch in "on" position. It is almost impossible for an electrician to touch a live bus bar
- The duct is capable of withstanding unusual electrical and mechanical stresses which might otherwise destroy it, based on present and future available short circuit values
- It incorporates lowest possible voltage drop practicable (see curves)
- It is specifically designed to use aluminum, but copper is available if desired
- Design incorporates a simplified joint with a minimum number of bolts
- Duct casing meets present building structural standards.

Separate plug-in switches may be attached easily and safely at almost any point and detached and moved at any time—even while power is still on. Design permits up to 10 take-offs per 10-ft section.

Safety features stem from interlocks which will not allow the bus plug to be installed with plug-in cover open or the switch on. It has also been designed so that one man can easily install it.

When installing, the first step is to hook the bus plug onto the duct casing. It is self-supporting, and the workman's hands are free to pick screw driver out of his pocket. The bus plug is then slid into position so that the safety interlock engages a slot in the plug-in casing.

The plug is shoved in as far as possible, then the plug-in cover is free to be opened. The plug is then shoved fully onto the bus duct. When mounted, it is impossible to close the cover against the



stallation

stribution system

lug fingers. To secure the lug, two captive screws on he end and one underneath re driven home.

For removing, the procedure s just the reverse order.

Joining sections of the duct s an easy job, too. When the luct is shipped, all of the in-ulators are in place in the oint. A minimum number of olts are needed to secure the oint.

When making a joint, all hat is necessary is to slip the ections together, then drive ome the four captive screws, ut in the four separate crews, and then tighten the us bar bolt from the outside. A Bellville washer allows roper amount of pressure to e applied. When properly ightened, there is a pressure f 2000 lb on the joint.

The duct is available in tandard 10-ft lengths. El-ows, short end-pieces and ther fittings are also avail-ble.

With this design, the duct an be safely supported on 0-ft centers.

The duct will be available in mpere ratings of 225 through 000 amps, with voltage ratings hrough 600v AC, single-, hree-phase and four-wire— nd full neutral available in ll sizes.

("XL BUStribution" Plug-n Duct is development of Bulldog Electric Products Di-vision, I-T-E Circuit Breaker Company, Dept. P&PSE, Box 77, Detroit 32, Mich.)
Circle 9788 inside back cover.

One way to control temperatures

when load swings are wide, sudden

A unique and low-cost air-controlled temperature regulating system provides accurate temperature control for systems subjected to wide and sudden load swings.

This is made possible by an ingenious cascading of an air signal to a pressure regulator.

Control accuracy of 6 to 8 degrees Fahrenheit over a 24-hour period under severe test conditions has been demonstrated by the system. Instantaneous load swings from 210 gpm down to 80 gpm water flow were handled while controlling temperature to within plus or minus 5° of the set point.

Extreme and rapid load changes were continuously experienced in this test installation which supplies steam for laundry service and a canning factory as well as domestic hot water to a large institution.

Immediate response to sudden changes in demand is made possible by the pressure-regulating action of the externally piloted main valve. Temperature control is obtained from the cascaded air system which loads the pilot.

By combining both functions in one simple and easy-to-maintain system, the need for the pressure-reducing valve has been eliminated.

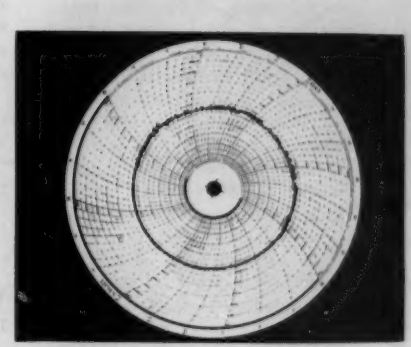
Quick response of the system is based on a bimetal temperature-sensing element. The temperature pilot continuously regulates a loading air pressure. This loading signal when applied to a pressure pilot to reflect temperatures causes it to reposition the main valve as changes in load require.

Only air used is that required to produce a loading. As an indication of air economy, the temperature pilot can be fed through as much as 12 feet of ⅛" capillary tubing.

Remote setting of control point and remote temperature indication are available.

Almost any range of temperature settings is available. Heater pressures up to 90 psi can be attained with 15 psi air-loading pressure. Valves for the system range in sizes from ¼" to 12".

(Air-Control Temperature Regulating System is development of Spence Engineering Company, Inc., Dept. P&PSE, Walden, N.Y.)
Circle 9789 inside back cover.



Temperature recording chart demonstrates accuracy of temperature control system: Temperature is held to within ± 5° of set point with load swings of 210 gpm down to 80 gpm water flow

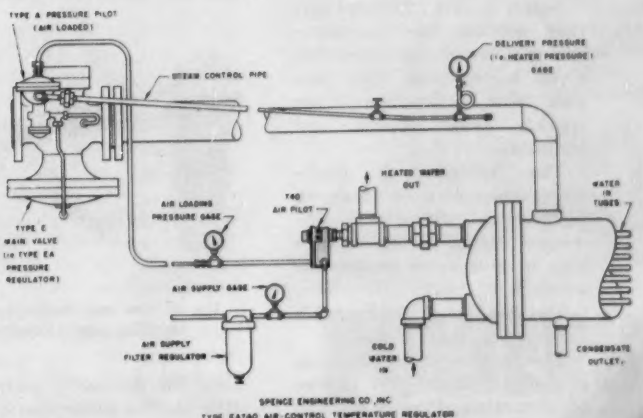
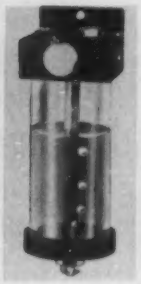

TYPE A PRESSURE PILOT (AIR LOADED)
STEAM CONTROL PIPE
DELIVERY PRESSURE (i.e. HEATER PRESSURE) GAGE
HEATED WATER OUT
WATER IN TUBES
AIR LOADING PRESSURE GAGE
TAO AIR PILOT
TYPE E MAIN VALVE (i.e. TYPE EA PRESSURE REGULATOR)
AIR SUPPLY GAGE
AIR SUPPLY FILTER REGULATOR
COLD WATER IN
CONDENSATE OUTLET
SPENCE ENGINEERING CO., INC.
TYPE EATAO AIR-CONTROL TEMPERATURE REGULATOR

Diagram of temperature regulating system that cascades air signal to pressure regulator

From page 27

passed through liquid in a transparent cylinder, and the rate of flow is shown by bubbles rising through the liquid. A needle valve at the top provides adjustment of flow from less than one bubble per second to approximately 20 cu ft per hour. Water, glycerine or any other non-corrosive liquid may be used. A check valve in the dip tube prevents the liquid from being forced up the type and out of the bubbler when the back pressure is greater than input pressure, eliminating need for a separate liquid trap. Other features include: a drain plug at bottom for easy removal of liquid, choice of Pyrex or plastic cylinder (pressure-tested to 100 and 200 psi respectively); and choice of four pipe connections, provided by two inlets and two outlets, all ¼" NPT.



(Sight feed bubbler is product of King Engineering Corp., Dept. P&PSE, Box 725, Ann Arbor, Mich.)
Circle 9790 inside back cover.

Protects face, top of head and chin

Safety helmet with combination acetate face protector and soft vinyl hood and bib gives top-of-head, full face and chin protection from sparks, flying objects and chemicals.

The headgear is interchangeable and is made of light-weight plastic with aluminum spring pivots on each side to give even tension for comfort.

The headband is adjustable for marked sizes 6 to 8.

The face protector is made of optical plastic and is free of distortion. Plastic beading protects the wearer from any rough edges of the shield.

Entire unit weighs less than 7 oz

The soft hood and bib are snapped into the top and bottom of the face protector by means of plastic bands equipped with snap buttons.

(Plastic safety helmet is product of Paulson Mfg. Corp., Dept. P&PSE, Fallbrook, California.)
Circle 9791 inside back cover.

Tells what you have inside those pipes

Pressure-sensitive tape in colors to meet ASA Pipe Coding Standards A-13 is designed to meet maintenance standards in plants and installations which require legend marking plus color banding of pipe lines. The self-sticking tape withstands temperatures up to 300°F.

Tape is available in following colors for banding: Yellow for dangerous materials;

Use of tape and marker quickly identifies pipe contents

Blue for protective materials; Red for fire protection equipment; Green for safe materials; Aluminum for steam lines; Orange for electrical conduit; and Standard White. Standard size rolls are 2¼-inch by 30-yard rolls.

For best identification, the tapes can be used with complementary pipe markers. This combination identifies pipe contents on the underside of the pipe with both color and legend, and completely around the pipe with a color band that identifies type of contents.

Both tape and markers are made from tough, durable vinyl-cloth with fadeproof colors.

(Pipe Banding Tape and Perma-Code Pipe Markers are products of W. H. Brady Company, Dept. P&PSE, 727 W. Glendale Ave., Milwaukee 9, Wisconsin.)
Circle 9792 inside back cover.

Car spotter keeps rope out of the way

For positioning railroad cars at sidings, car spotter is designed so that the wire pulling rope is neatly reeled around a drum as pulling progresses, eliminating safety hazard of allowing the rope to coil up in a pile at the operator's feet.

The machine can be operated without the operator's touching the rope and can be equipped to operate by remote control from convenient location.

The spotter is fitted with a herringbone gear reducer which provides 40 percent more rope horsepower than worm-driven models. Because the rope is anchored to the drum flange for positive drive, power loss due to slippage is eliminated.

Two sizes are available — one has a 5 hp motor with 105 DHA reducer and a 10" drum using ⅜" rope; the other has a 7½ hp motor with 150 DHA reducer and a 13" drum using ½" rope.

(Jones Type OP car spotter is manufactured by Hewitt-Robins Incorporated, Dept. P&PSE, 666 Glenbrook Rd., Stamford, Conn.)
Circle 9793 inside back cover.

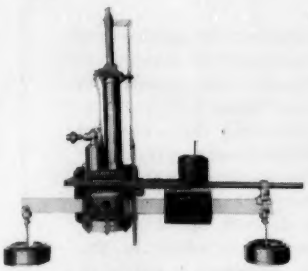
Damper regulator for boilers 5 to 150 psi

Maintains desired boiler pressure within narrow limits

Damper regulator which also regulates fans, stokers, oil and gas control valves is designed for use on any boiler that operates at pressures from 5 to 150 psi.

The device may be used to actuate lever-operated balanced valves for pressure-regulating service, either reducing or unloading.

The hydraulic regulator repositions dampers and lever-



Regulator regulates fans, stokers, fuel valves

operated valves in response to small changes in the controlled pressure. Adjustment of the controlled pressure is made by adding weights or removing them from the lever of the regulator.

Minute changes are accomplished by repositioning the sliding weights.

The regulator, which continuously maintains the desired boiler pressure within narrow limits by automatically adjusting boiler draft, moves the damper on pressure changes of as little as ¼ psi.

It is equipped with a compensating device which provides increased fuel economy and boiler efficiency.

Actuated by city water pressure with small water consumption, the regulator is easily changed from direct to reverse-acting.

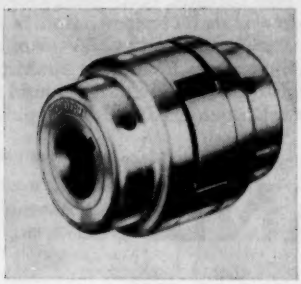
(No. 5000 hydraulic damper regulator is manufactured by Atlas Valve Company, Dept. P&PSE, 280 South St., Newark, N.J.)
Circle 9794 inside back cover.

Aluminum couplings are self-aligning, need no lube

Designed for light-duty applications, line of aluminum couplings is manufactured in six sizes with 20 standard bore sizes ranging from ¼" to 1½". Other bore sizes and taper bores are available.

The couplings are furnished with Keyways and set-screws and will transmit up to 10 hp at 1800 rpm.

In addition, they are non-corrosive and require no lubrication. They are self-aligning and automatically compensate for end-play, lateral and angular misalignment.



Aluminum couplings will transmit up to 10 hp at 1800 rpm

Only three parts comprise the design — two aluminum flanges with projecting segments that engage each other through a non-metallic insert which carries the load in compression. The non-conducting insert also eliminates both dynamic and static electricity and absorbs shock and torsional vibration.

The couplings weigh from approximately five ounces up to two pounds.

(Aluminum "Bondtru" Flexible Insulated Couplings are manufactured by Charles Bond Company, Dept. P&PSE, 617-623 Arch St., Philadelphia 6, Pennsylvania.)
Circle 9795 inside back cover.

Putting valves to test made easy by bench

Valve test bench offers a complete, packaged method for pressure testing all types of valves.

The bench has two test plates: one for ½" through 2" screwed valves and 8" through 10" flanged valves, and one for 2½" through 6" flanged valves. Seperate controls and gages are available so that two different valves may be tested at the same time.

Valves may be tested with either gas or liquid

Special adapters are furnished with each unit for quick change-over from one size and type of valve to another.

Valves may be tested with either gas or liquid within a pressure range of 0 to 1000 psi on the standard bench. Units are available for higher pressures.

Easily mobile, the bench may be used in the field on turnarounds or new construction work.

(Valve test bench is product of Piping Engineering Company, Dept. P&PSE, Tulsa, Oklahoma.)
Circle 9796 inside back cover.

Plastic pipe, fittings are designed for many uses

Complete line of fittings, in conjunction with reinforced plastic pipe, finds wide application in industry where corrosive atmospheres exist.

The pipe has been tested in fresh, salt and waste water, sewage, oils, solvents, gases, acids and alkalis. It may be used for ducts, conduit and handrails.

The fittings include 90° and 45° elbows, tees, and couplings, among others, for either threaded-end or plain-end pipe. Fittings for the latter are connected by a patented locking wedge feature.

Under test and soon to be released are flanged and Victualic-type fittings, both made entirely of fiberglass and epoxy.

These will be useful where make-and-break connections are desired.

The plastic pipe comes in rigid 20-ft lengths in 2 to 8 inch diameters. Outside pipe diameters exactly equal those of standard iron pipe and permit interconnecting with other lines and equipment.

Although rigid, the pipe is also sufficiently flexible to follow the contour of a normal ditch and will not cold flow or sag in use.

(Bondstrand pipe and fittings are manufactured by Amercoat Corporation, Dept. P&PSE, 4809 Firestone Blvd., South Gate, Calif.)
Circle 9797 inside back cover.

Pocket-size instrument indicates phase sequence

2 models are available for 60 and 400 cps

Pocket portable instrument for indicating phase sequence in three-phase power systems contains no moving parts or batteries.

Two models are available — The model 40 is for 60-cps power and has a switch for adjustment to 120, 240 and 480 volts. It measures 3" x 5" x 2".

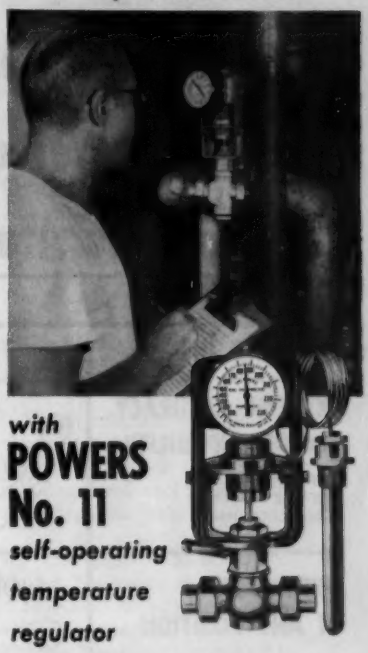
The Model 44 instrument is designed for use with 400-cycle power systems.

The three insulated test leads are connected at random to the three-phase conductors. When the lamp marked "ABC" flows, the sequence is as designated by the test leads. If the lamp marked "CBA" glows, the phase sequence is the reverse of the lead designation.

(Phase Sequence Indicators are products of Associated Research, Inc., Dept. P&PSE, 3777 W. Belmont Ave., Chicago 18, Ill.)
Circle 9798 inside back cover.

VISIBLE PROOF

of constant temperature control



with POWERS No. 11 self-operating temperature regulator

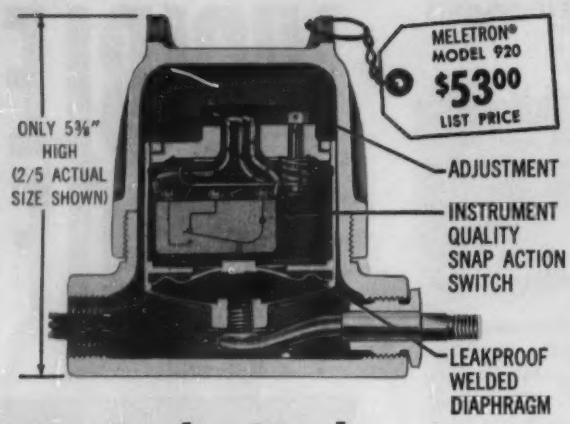
This big four-inch dial gives a quick, visual means of checking controlled temperatures . . . an accurate guide for regulator adjustment.

Designed for precise temperature control, the Powers No. 11 Regulator is self-powered . . . simple, compact and dependable. Full throttling action is gained without the aid of *any* external power source. Special valve stem lubricator eliminates binding. Big double ply metal bellows provide extra valve power — longer life. Union body assures easy installation.

For specifications, valve sizes, types and temperature ranges, call your Powers branch office—engineering services in 66 cities. Write for Bulletins Nos. 329 and 330.
The Powers Regulator Co., Dept. 1259, Skokie 50, Ill.

POWERS
TEMPERATURE CONTROL

Circle 9799 inside back cover.



Here's the Simplest Diaphragm Pressure Switch for Explosive Atmospheres

WE BUILD IN	WE DON'T USE
EXTREME ACCURACY and DEPENDABILITY maintained during operating life due to direct acting design	LINKAGES & BEARINGS which, as they wear, make the setting of the pressure switch drift.
OPERATION IN ANY POSITION which saves the installation costs encountered in mounting a switch that uses liquid switching elements	LIQUID SWITCHING ELEMENTS which make the switch difficult to mount and very critical to vibration.
IMMUNITY TO VIBRATION you can mount the switch directly on your vibrating or moving equipment.	ACCORDION BELLOWS which make the pressure switch sensitive to vibration.

ASK FOR NEW CATALOG 9-PS FREE

PRESSURE SWITCH DIVISION

barksdale valves

5125 Alcoa Avenue, Los Angeles 58, California

Circle 9800 inside back cover.

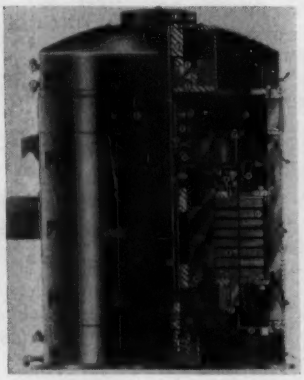
NEW DEVELOPMENTS

Wound-rotor motors are vertical, feature high speed

High-speed wound-rotor vertical motors with a wide range of enclosures are offered in 150 hp and up, with frames 584 and larger.

Featuring solid and hollow shafts, the motors are designed for applications requiring high starting and accelerating torques with low inrush current or adjustable speed control.

The rotor and stator cores are precision-notched for accurate alignment. Coil extensions are kept as short as possible and are firmly anchored to an insulated steel ring to prevent coil movement. All rotor connections are electrically brazed to allow maximum resistance to all thermal and mechanical stresses.



Motor is cooled by large volumes of low-velocity air

The slip ring assembly, built and balanced as a separate unit, is partially spanned by the brush holder assembly which can be removed as an independent unit for periodic inspection and servicing.

In addition to standard insulations, a number of special materials can be supplied: silicone rubber, acrylic and epoxy resins and others to meet unusual moisture, ambient temperatures and chemical conditions.

(Wound-rotor vertical motors are manufactured by The Ideal Electric and Manufacturing Company, Dept. P&PSE, Mansfield 22, Ohio.)
Circle 9801 inside back cover.

NEW!

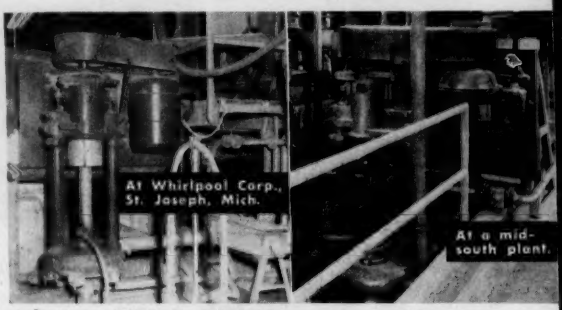
Crane Formula 425-A Thread Compound prevents seizing and galling

It's the best lubricating compound you can get for high loading, high temperature installations up to 1050° F.—screwed or flanged. Prevents seizing and galling damage to pipe threads, bolts and gaskets . . . gives tight metal-to-metal contact. Joints open readily—and you can re-use materials—even after long exposure to high heat. Conforms to Military Spec. MIL-A-907. Stocked in 1- and 4-pound cans by your local Crane Branch or Crane Wholesaler.

FREE SAMPLE . . . Just ask your Crane Representative

CRANE® Crane Co., Gen'l Off.: 836 S. Michigan Ave., Chicago 5, Ill.

Circle 9802 inside back cover.



This NAGLE PUMP cuts cost— eliminates shut-downs in porcelain enamel flow coating

A number of appliance manufactures are using Nagle type "TDV-R" pumps successfully, handling enamel slip in flow coaters. The two installations shown above are typical.

This pump has no bearing in contact with the mixture being pumped—no stuffing box—no leakage problems—no dilution—no contamination. It is a single stage bottom entrance pump. Impeller and casing are abrasion resistant. Patented water-end clamp-bolt assembly makes possible the easy removal, replacement and adjustment of the water-end parts. The "TDV-R" is just one of the many Nagle vertical and horizontal shaft pumps designed to resist corrosion, abrasion and heat or a combination of these things. Send for Nagle Pump Selector, Nagle Pumps, Inc. 1228 Center Ave., Chicago Heights, Illinois.

Tough jobs call for **Nagle PUMPS** FOR ABUSIVE APPLICATIONS EXCLUSIVELY

Circle 9803 inside back cover.

NEW LITERATURE

for effective plant and power services operation

Reviews of books and industrial bulletins describing equipment, supplies, services

Stainless steel flexible hose

Stainless steel hose described in 4-page bulletin is not only flexible, but can handle safely pressures up to 4000 psi, temperatures through 1500°F.

Hose is used to absorb vibration, correct for misalignment and offset motion; as chemical loading hose, for weight tank connections, as an expansion compensator, etc.

Engineering information and tabular data on pressure capabilities, flexibility, suggested usage, formulae for determining best lengths are given. Threaded and flanged end fitting connections are diagrammed. Special fittings can be furnished to meet individual requirements, and engineering help on specific problems is offered.

(Engineering data and specification folder No. SSDS-562 is available from Allied Metal Hose Co., Dept. P&PSE, 3797 Ninth Street, Long Island City 1, New York.)
Circle 9804 inside back cover.

Reads performance of engines

Two-page data sheet gives construction and principle of operation of a direct-reading performance meter for diesel, gasoline, natural gas and steam engines.

Pressure is read directly on the meter's dial, thereby permitting rapid adjustment of engine for uniform cylinder operation.

(Bulletin K15A is issued by The Korfund Company, Inc., Dept. P&PSE, 28-28B 32nd Place, Long Island City 1, New York.)
Circle 9805 inside back cover.

Deaerating heaters — spray types shown

A bulletin on spray type deaerating heaters has been revised and enlarged.

The eight-page bulletin discusses many aspects of the process and equipment, including principles of deaeration, operation, standard designs available, features and accessory equipment. It is illustrated with many drawings and photographs.

(Bulletin WC-101C is available from Graver Water Conditioning Co., Dept. P&PSE, 216 West 14th St., New York 11, N. Y.)
Circle 9806 inside back cover.

Mass flowmeter reads in lb

Eight-page bulletin describes theory and operation of industrial flowmeter that measures flow of fuels, industrial liquids, and gases directly in pounds.

(Bulletin GEA-6925 is issued by General Electric Co., Dept. P&PSE, Schenectady 5, New York.)
Circle 9807 inside back cover.

Panel lights

Four series of lights—designed to mount from front of panel in a 15/32" clearance hole—are described in four-page bulletin.

Types covered include neon, incandescent, water-tight assemblies, and edge-lighting assemblies.

(Form L-162 is issued by Dialight Corporation, Dept. P&PSE, 60 Stewart Ave., Brooklyn 37, N. Y.)
Circle 9808 inside back cover.

How to stop explosions in compressor starting

Latest findings on the mechanism of explosions in pipelines and compressor starting air lines are presented in bulletin.

Authored by Robert S. Ridgway, Standard Oil of California, the article discusses research on the nature of explosions and shock waves in piping. These observations are then applied to compressor air starting systems to provide a more thorough understanding of the origin of explosions and the propagation of shock waves within the piping. The study concludes with a discussion of preventive measures that can be taken to eliminate explosions in air starting systems.

(Bulletin 173 is issued by Clark Bros. Co., Dept. P&PSE, Olean, N. Y.)
Circle 9809 inside back cover.

Sectional belt conveyor book

How to use and select standardized sectional belt conveyors is described in 40-page book.

Pre-engineered and shop-assembled from matched components, the conveyors are adaptable to a large proportion of belt conveyor applications and operating conditions. They are available in four belt widths of 18, 24, 30 and 36 inches.

Illustrations show installation applications in a variety of industries and typical layouts.

(Book 2779 is available from Link-Belt Company, Dept. P&PSE, Prudential Plaza, Chicago, Ill.)
Circle 9810 inside back cover.

Water treatment paper reprinted

New types and designs of water treatment plants to meet the demand for higher quality feedwater for: higher boiler pressures over 1500 psi; once-through boilers for supercritical pressure (over 3206 psi) as well as sub-critical pressures and nuclear plants are discussed in paper.

The paper "Modern Water Treatment Developments for Boiler and Nuclear Plants" was delivered before the ASME.

(Reprint No. 123 can be obtained from Cochrane Corp., Dept. P&PSE, 17th Street Below Allegheny, Philadelphia 32, Pennsylvania.)
Circle 9811 inside back cover.

Explains 8 electric tachometer models

Eight indicator models and three generators that make up line of electric tachometers are described and pictured in four-page bulletin.

Full size scales are pictured for the eight indicators designed for panel mounting.

(Electric tachometer bulletin is available from The Electro-Mechano Company, Dept. P&PSE, 241 East Erie St., Milwaukee, Wis.)
Circle 9812 inside back cover.

Fired heat exchangers explained in bulletin

Various types of fired heat exchangers including five standard types are described in new bulletin.

Ranges of Btu/hr duty, pressure and temperature ratings, and typical pressure drops are given. Special designs are also described briefly. Fired heat exchangers can meet temperature ratings up to 1900°F, flow rates of air up to 550 lbs/sec., and pressure ratings up to 5000 psig.

(Bulletin No. 113 is issued by Thermal Research & Engineering Corp., Dept. P&PSE, Conshohocken, Pa.)
Circle 9813 inside back cover.

Belt-conveyor pulley fully explained

Hydro-expansion-formed belt conveyor pulley that increases conveyor belt life, has a 25 percent greater strength, is concentric to within .030 inches and is free from crown welds, is described and illustrated in 8-page booklet.

The welded steel pulley is formed in a die by hydraulic pressure for accurate control of crown contour and pulley diameter. The pulleys are free from back-up welding bars that unbalance pulleys and add stresses and strains to the structure.

(Book 2540 is issued by Link-Belt Co., Dept. P&PSE, Prudential Plaza, Chicago 1, Illinois.)
Circle 9814 inside back cover.

Plastic pipe data

A general-purpose rigid plastic pipe for industry, utilities, irrigation, mining and marine use is described in 16-page bulletin.

The bulletin is complete in its technical data, covering fittings and valves as well as pipe.

The plastic material is nontoxic, odorless and tasteless and has been approved for use with drinking water.

(Bulletin No. CE-80 is issued by American Hard Rubber Company, Division of Amerace Corporation, Dept. P&PSE, Ace Road, Butler, New Jersey.)
Circle 9815 inside back cover.

Flexible-shaft tools

Eight-page catalog lists flexible-shaft equipment and other labor-saving tools.

Equipment described includes variable-speed, flexible-shaft grinders.

(Catalog No. 59 is issued by Wyzenbeek & Staff, Inc., Dept. P&PSE, 223 N. California Ave., Chicago 12, Ill.)
Circle 9816 inside back cover.

One way to measure galvanic potentials

For measuring DC galvanic potentials in corrosion control and cathodic protection, a dual-range, direct-reading voltmeter, weighing 2½ lb, is described in two-page bulletin.

How it can be applied to measuring open-circuit structure to soil voltages is also presented.

(Bulletin 1-3 is issued by Associated Research, Inc., Dept. P&PSE, 3777 W. Belmont Ave., Chicago 18, Ill.)
Circle 9817 inside back cover.

Lots of information on floodlights

Miniature edition of popular floodlight catalog contains 184 pages of information.

Included in the pocket-sized book is all the original material: How to Select Floodlights, General Purpose Floodlights, Heavy Duty Floodlights, Mercury Vapor Floodlights, Lighting for Hazardous Locations, Floodlight Poles, Accessories, Installation Suggestions and Lighting Calculations.

(Bulletin 2714 is issued by Crouse-Hinds Company, Dept. P&PSE, Syracuse 1, N.Y.)
Circle 9818 inside back cover.

Gearmotors bulletin has 32 pages

Thirty-two page bulletin contains technical information on horizontal- and vertical-mounted gearmotors with capacity up to 125 hp and a variety of output speeds ranging from 780 rpm to 1.2 rpm.

Booklet includes load characteristics table for applications in various industries and different types of equipment, and a selection table arranged according to AGMA classifications.

(Bulletin J-17 "Gearmotors" is issued by Hewitt-Robins, Inc., Dept. P&PSE, 666 Glenbrook Road, Stamford, Conn.)
Circle 9819 inside back cover.

A quick guide to nickel alloys

Booklet entitled "A Quick Guide to The Nickel-Containing Casting Alloys" presents condensed, informative data on the range of properties offered, industries served, and general applications for each of the alloys included.

Brief write-ups of each material, including alloy content and nominal properties, complete the booklet.

(Booklet "A Quick Guide to The Nickel-Containing Casting Alloys" is issued by The International Nickel Co., Inc., Dept. P&PSE, 67 Wall Street, New York 5, N.Y.)
Circle 9820 inside back cover.

Industrial gloves of all kinds

Complete line of industrial gloves and finger cots are illustrated and described in 16-page catalog.

The gloves are available in disposable polyethylene, natural rubber, lined and unlined latex, lined and unlined black neoprene, unlined white neoprene, Buna-N, and Compar plastic. Linemen's natural rubber gloves as well as leather protectors are also available.

(Catalog No. WR-459-28 is issued by The Wilson Rubber Company, Industrial Division, Dept. P&PSE, 1200 Garfield Ave., S.W., Canton 6, Ohio.)
Circle 9821 inside back cover.

Instruments, control — all kinds shown

Eight-page, illustrated condensed catalog is divided into seven sections, each of which describes a different type of instrument or control.

Products include instruments for pressure, flow, temperature, level, gas analysis and combustion control.

(Bulletin 59-C091 (297) is issued by The Hays Corporation, Dept. P&PSE, Michigan City, Ind.)
Circle 9822 inside back cover.

Pressure reducing valves are pilot-operated

Pressure reducing valves are single-seat, spring-loaded, piston-operated-type and are actuated by internal pilots. They can be used for steam, oil, air, gas, or water. Maximum inlet pressures and temperatures range from 250 psi at 450°F in the cast iron body valve to 900 psi at 750° in the five steel body valves.

Stellited main valve and main valve seat are outstanding features of these self-contained valves which can be disassembled and serviced without removal from the line. Main valves and pilot valves, also Stellited, are protected by built-in strainers. Available with screwed or flanged ends, the valves have no stuffing boxes or bellows and wearing parts are renewable.

(Four-page reducing valve folder is issued by Atlas Valve Co., Dept. P&PSE, 280 Smith St., Newark 5, N. J.)
Circle 9823 inside back cover.

For more information on items reported in the New Literature section circle corresponding numbers on reader service card inside back cover.

Mechanical packings — complete info given

Comprehensive information about a complete line of mechanical packings is contained in 64-page catalog.

Text is supplemented by a wide variety of photographs, illustrations, and specification charts and tables.

Cross-section photos are used extensively to reveal all characteristics of the various materials. Selection chart helps to choose most suitable packing construction for a particular operation.

(Form PK-131A is issued by Johns-Manville, Dept. P&PSE, 22 East 40th St., New York 16, N.Y.)
Circle 9824 inside back cover.

Something really **new**

full ported - direct lift
SOLENOID VALVES
by
Atkomatic
Feature the new *uramic*
solenoid that assures
reliable operation regardless
of line pressures.

•

PORT SIZES to **3"**
PRESSURES from **ZERO** to **3,000** psi

Available in bronze
or stainless steel

Send for Bulletin S-1

ATKOMATIC VALVE COMPANY, INC.
545 West Abbott Street • Indianapolis 25, Indiana

Circle 9825 inside back cover.

YOU CAN EARN 20 DOLLARS

BY
HAVING A NOMOGRAPH IN
Plant and Power Services Engineer

PLANT and POWER SERVICES ENGINEER is looking for good nomographs designed to simplify calculations necessary to efficient plant and power services. If you have such a nomograph that has been helpful to you in your work — and it has not been published before — send it to:

Data Editor
PLANT and POWER SERVICES ENGINEER
111 E. Delaware Place
Chicago 11, Illinois

CUT HERE AND FILE

Plant-Power Services Engineer **nomograph** 42

COST OF PUMPING

DUKE SILVESTRINI,
Allis-Chalmers Mfg. Co.
and **D. S. DAVIS**
School of Chemistry, University of Alabama

For liquids at temperatures where their viscosities are not greatly different from that of water at 68°F, the cost of pumping in cents per 1000 gallons is given by:

$$C = 0.315 \frac{PH\delta}{E}$$

where

C = cost, cents/1000 gal
P = cost of power, cents/kw-hr
H = total dynamic head, ft
δ = specific gravity
E = over-all efficiency of pump and motor, %

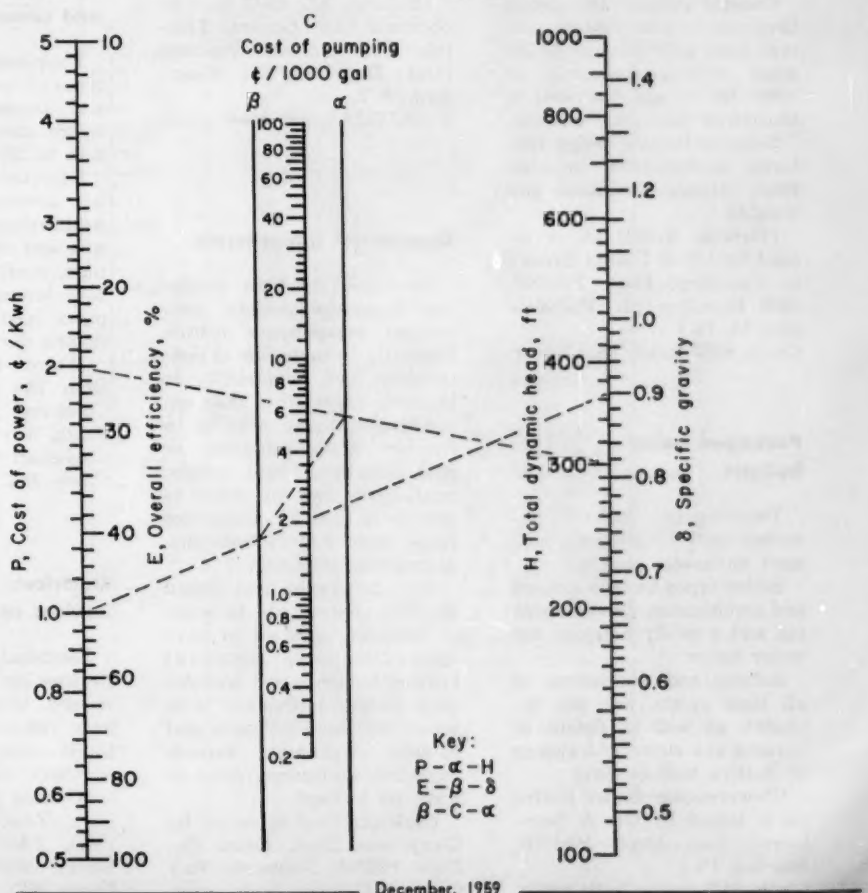
The accompanying nomograph permits this equation to be solved readily and accurately.

Typical Example

What is the cost of pumping 1000 gallons of a liquid with a specific gravity of 0.900 (viscosity near that of water at 68°F) against a total dynamic head of 300 ft if over-all efficiency is 50% and power costs 2 cents/kw-hr?

Following the key on the chart, connect 2 on P scale and 300 on H scale. Mark intersection with the α axis. Connect 50 on E scale and 0.900 on δ scale with a straight edge.

Mark this intersection with the β axis. Connect the intersections on the α and β axes, and read the desired cost of pumping on the C scale as 3.4 cents per 1000 gallons.



December, 1959

Catalog describes general use ejectors

General utility ejectors for creating vacuum, increasing pressure or mixing gases are featured in 4-page flier.

Designed to operate with steam or motive gas at 75 to 200 psig, the ejectors can be used to handle either wet or dry mixtures as well as mixtures containing solid materials such as chaff or dust.

Available in 1½", 2", 3" and 4" suction sizes with a total of 16 different ejectors, the design features simplified two-piece construction.

(Form No. 9046 can be obtained from Ingersoll-Rand, Dept. P&PSE, 11 Broadway, New York 4, N.Y.)
Circle 9826 inside back cover.

Shows heavy duty DC circuit breaker

General purpose DC circuit breakers — available in ratings from 1200 through 12,000 amps continuous-current at 1000v DC — are described in illustrated four-page bulletin.

Subjects include design features, performance, applications, ratings, dimensions and weights.

(Bulletin S-4601-1A is issued by I-T-E Circuit Breaker Company, Dept. P&PSE, 1900 Hamilton St., Philadelphia 30, Pa.)
Circle 9827 inside back cover.

Packaged boiler bulletin

Twelve-page bulletin describes and illustrates packaged automatic boilers.

Boiler types include gas, oil and combination gas-oil models, and a newly designed hot water boiler.

Ratings and dimensions of all sizes in the line are included, as well as details of burners and cutaway drawings of boilers and burners.

(Powermaster Boiler Bulletin is issued by Orr & Sembower, Inc., Dept. P&PSE, Reading, Pa.)
Circle 9828 inside back cover.

Silicone rubber protects motors

Life of motors subjected to moisture, chemicals, abrasive dust, and other contaminants can be extended by providing the stator windings with a protective covering of silicone rubber.

The product permits drip-proof motors to be applied in certain severe applications that in the past have required totally enclosed motor constructions.

Supplied as a viscous liquid which, after the addition of a curing agent, cures at room temperature to produce a tough rubber compound, the silicone rubber has excellent physical and electrical properties, as well as resistance to temperature extremes, moisture, ozone and aging. Due to low viscosity, rapid cure characteristics and handling flexibility, the product can easily be applied as an encapsulant.

(Bulletin AD 13-C may be obtained from General Electric Co., Silicone Products Dept., Dept. P&PSE, Waterford, N.Y.)
Circle 9829 inside back cover.

Centrifugal compressors

Available in both single- and two-stage designs, centrifugal compressors feature flexibility in materials of construction and adaptability to handling gases other than air.

Advantages are said to be freedom from vibration or flow pulsations, light weight, small space, and the ability to provide oil-free air. Capacities range from 800 to 8000 cfm, pressure to 1000 psia.

The cast casing and forged impeller element can be made of materials selected to meet application needs. Special bearing housings and seal designs permit lubrication with water or other lubricants, and obviate explosion hazards caused by oil contamination or toxic gas leakage.

(Bulletin P-12 is issued by Compressor Dept., Elliott Co., Dept. P&PSE, Jeannette, Pa.)
Circle 9830 inside back cover.

Transfer switch has dual circuit breaker

Automatic transfer switches with new relay control features are highlighted in 4-page illustrated bulletin.

The transfer switches designed for service to 600 volts, 800 amps with interrupting capacities to 50,000 amps rms incorporate an exclusive dual circuit breaker design that permits power to be mechanically transferred by a common motor-driven linkage.

Switches are available for full-relay, 3-phase, 4-wire service with transfer initiated when any or all legs drop below 70% of normal.

(Bulletin 07500-G is issued by Lake Shore Electric Corp., Dept. P&PSE, 205 Willis Street, Bedford, Ohio.)
Circle 9831 inside back cover.

Insulations and cements

Four-page brochure lists types of industrial insulations and insulating cements for temperature range from sub-zero to 1900°F.

Easy-to-read tabular product selection guide indicates applications for high temperature and superheated surfaces; high, medium and low pressure steam lines; cold water pipes; heating and air conditioning ducts; and breechings.

(Form 6451 is available from The Philip Carey Mfg. Company, Dept. P&PSE, 320 South Wayne Ave., Lockland, Cincinnati 15, Ohio.)
Circle 9832 inside back cover.

Electrical, lubricating devices catalog

Electrical and lubricating devices are described in condensed 12-page catalog. For easy reference, all items are listed complete with catalog numbers, capacities and sizes.

(Catalog No. 59 is available from Trico Fuse Mfg. Co., Dept. P&PSE, 2948 N. 5th Street, Milwaukee 12, Wis.)
Circle 9833 inside back cover.

Guide to purging refrigeration lines

Twelve-page bulletin presents helpful data on the automatic removal of air from refrigeration systems.

It answers such questions as why purging is necessary, how non-condensible gases affect efficiency, methods of purging, where to make purge connections, and how to use the refrigerated purger.

(Bulletin No. 700 is issued by Armstrong Machine Works, Dept. P&PSE, Three Rivers, Mich.)
Circle 9834 inside back cover.

Turbine type pumps bulletin

Turbine type pump bulletin features selection tables, limitation charts, dimensions, construction specifications, and engineering-architects specifications.

With capacity range up to 150 gpm, pressures to 300 psi, and temperatures to 275°F, the pumps are applicable for boiler feed, condensate return, fresh water service, brine service, ice water circulation, filter service, caustic liquid handling, sprinkler service.

(Bulletin No. S-111 is issued by Aurora Pump Div., The New York Air Brake Co., Dept. P&PSE, Loucks Street, Aurora, Ill.)
Circle 9835 inside back cover.

How to determine your power loads

Four-page bulletin discusses theory and application of tie-line load, frequency load, reactive power, and power limiting control in industrial plants and describes strip-chart recorders and control equipment available.

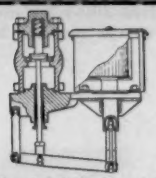
Diagrams and descriptions of typical plant applications are included.

(Bulletin GET-2916 is issued by General Electric Company, Dept. P&PSE, Schenectady 5, N. Y.)
Circle 9836 inside back cover.

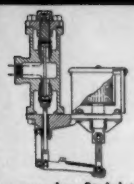
BIG LINE-UP
BIG PERFORMANCE

Johnson Solenoid Valves are built for heavy duty service . . . handling, air, water, steam, heavy viscous liquids. No pilots or pistons; powerful leverage design opens smaller valves against 250 lbs. Because of the remoteness of the solenoid, temperatures up to 400° F. are easily handled without adverse effect on the solenoid coil. Bodies are bolted together. Explosion-proof models also.

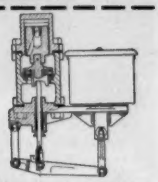
JOHNSON
Direct Operated
SOLENOID VALVES



Normally closed service, stainless steel valve and seat. Sizes ⅜"-3". Also for normally open service, and with Jenkins Disc.



3-way valve. Stainless steel valves and seats. Sizes ½"-1½".



Dashpot construction, cushions closing to avoid water hammer. Jenkins Disc. Sizes ¾"-2".

Write for Bulletin "V"

THE JOHNSON CORPORATION
807 Wood St., Three Rivers, Mich.

Circle 9837 inside back cover.

IS YOUR INSTRUMENTS LITERATURE FILE INCOMPLETE

A new bulletin on instruments is being offered. You'll find a review of this bulletin in the NEW LITERATURE section, starting on page 33. This bulletin is just one of over 50 selected pieces of plant and power services literature reviewed in this issue.

CUT HERE AND FILE

Plant-Power Services Engineer

nomograph 43

Flow of water through concrete pipe

CLIFFORD L. DUCKWORTH
East Alton, Ill.

This nomograph permits one to estimate pressure drop in water flowing through concrete pipe of varying construction. It is based on the equation[1]:

$$H = \frac{V^2}{C^2 d^{1.25}}$$

where

V = velocity, ft/sec
C = factor correlating type of construction
H = pressure drop, ft of water

The nomograph is applicable to pipe from 8 to 63.5 inches in diameter. For expansion, flow velocity and pressure drop have been drawn as double scales.

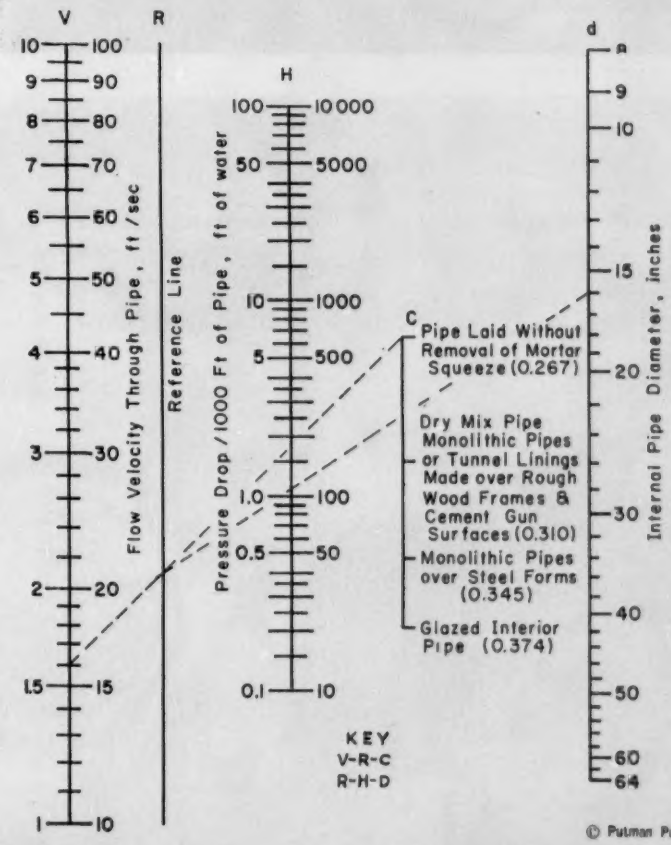
Typical Example

Water is flowing through a 16" pipe laid without removal of the mortar squeeze. The water velocity is 16 ft/sec. A line is drawn between 16 on the V scale and the appropriate point on the C scale.

A line connecting 16 on the d scale with the intersection on the reference line, R, crosses H at 110.

LITERATURE CITED

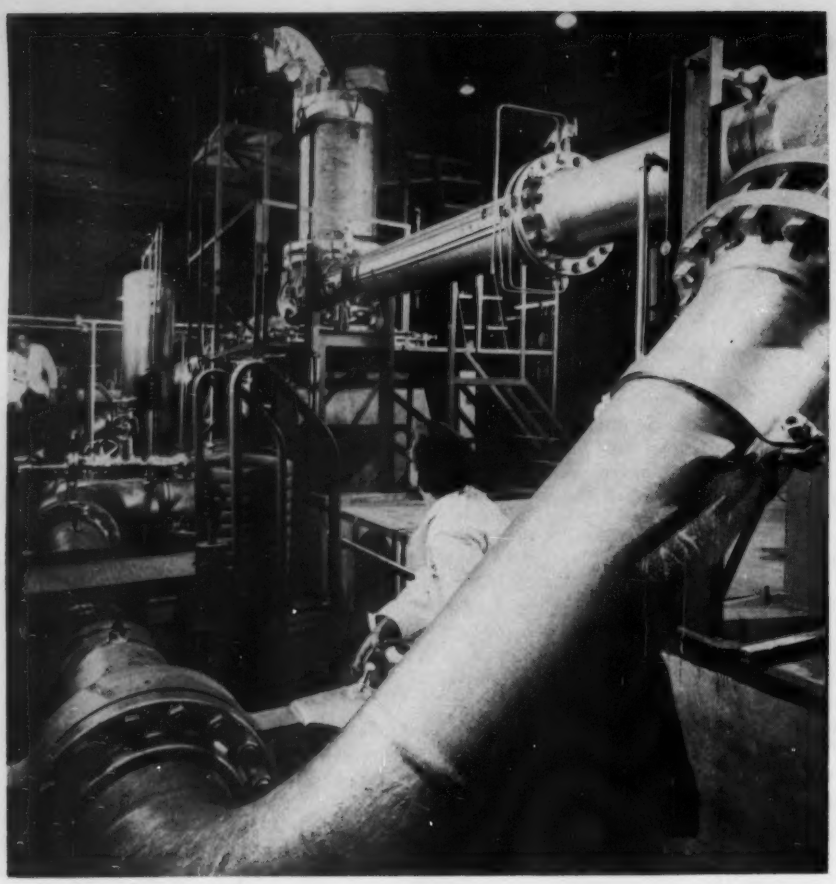
1) BROCK, MAXEY, "Chemical Engineering," 64, No. 2, 290 (1957).



© Putman Publishing Company 1959

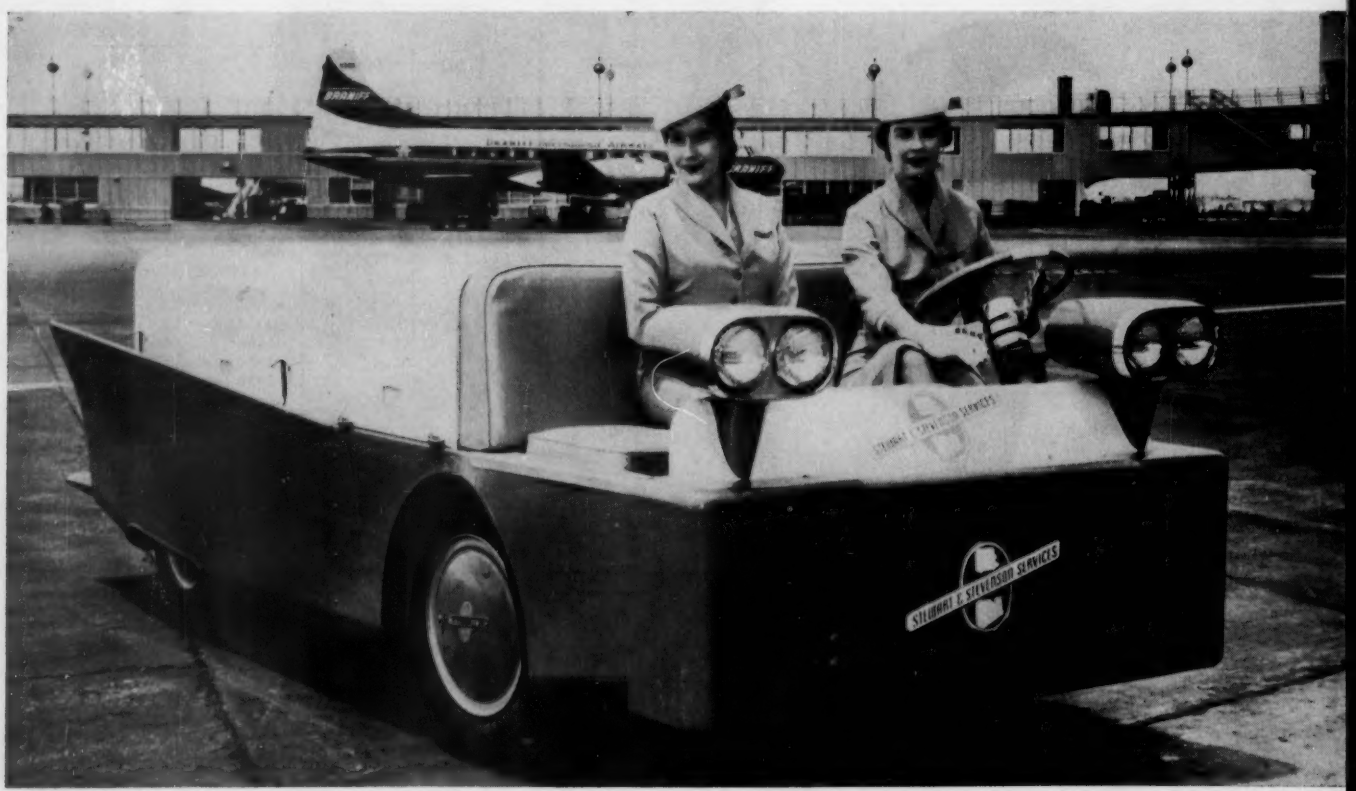
December, 1959

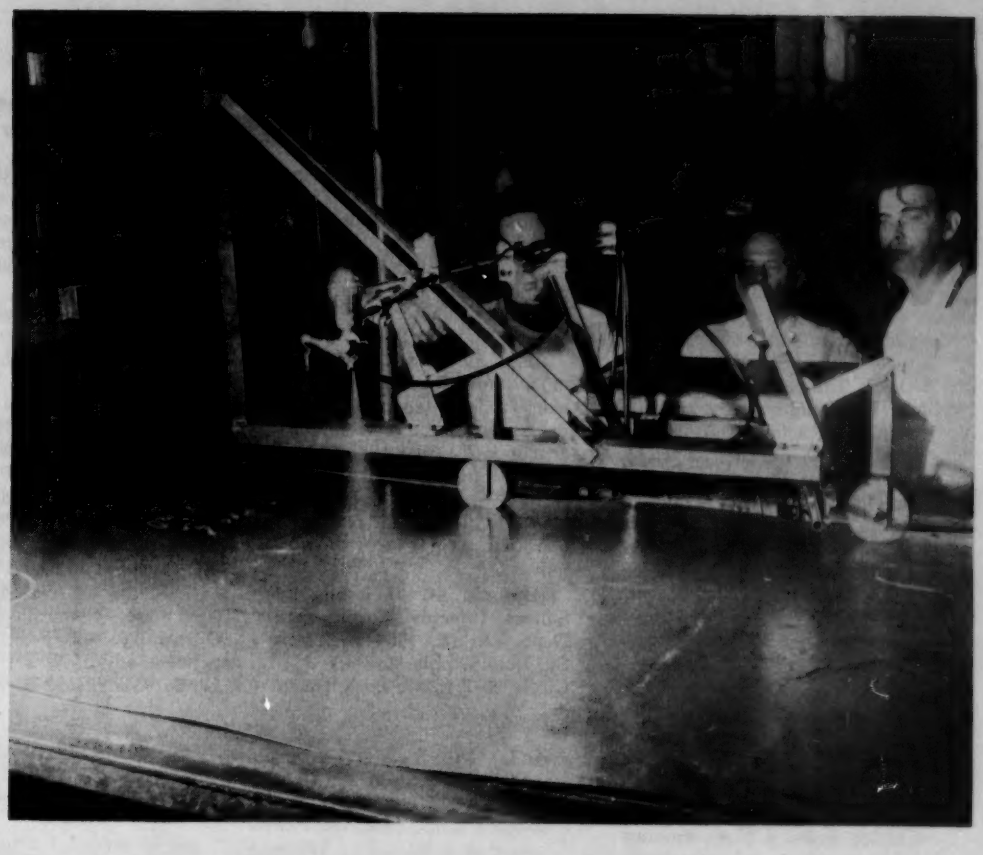
PHOTO NEWS



LOOP THE LOOP — Engineers at Westinghouse's atomic equipment department at Cheswick, Pa., have built a "twin-loop" test facility for canned motor pumps designed for controlled circulation boiler applications. The loop allows the engineers to test full line of pumps without changing basic configurations of the loop.

ALL DRESSED UP FOR TRAVELING is this mobile generator (and the lovely stewardesses). Designed for powering commercial jet airliners, the unit will be offered to industry as an answer to portable power needs and will be available in power ranges of 30 to 250 kva. Electric output is primarily 60 cycle and 400 cycle AC with an auxiliary DC source. It can travel on highways or, equipped with larger wheels, rough terrain. It even comes with auto-style tail fins if desired. (Mobile generator set was developed by Stewart & Stevenson Services, Inc., Dept. P&PSE, 4516 Harrisburg Blvd., Houston, Texas.)
Check 9838 on Reader Service Card.





FINDING FAULTS in sheet steel by using ultrasonics is the idea conceived by a Chrysler Corporation employee who is neither a mechanical engineer nor a scientist. In the photo above, the sound wave scanner sprays faulty spots with a purple dye as the sheet steel passes under at a rate of 200 feet per minute.

FOR TRAINING PURPOSES, this prototype of a proposed line of nuclear training and research reactors is a high-neutron flux, low-power type built by the Nuclear Development Corporation of America. Design of the 25kw heterogeneous thermal reactor provides for a small fuel load with a large experimental region remote from the active core housing the enriched fuel elements.

COMPLETE PROTECTION from high-voltage arcing is given by safety helmet and shield developed by Safety Products Division of American Optical Co. Having an acetate window, vulcanized fiber head-guard, and Neoprene-coated fiberglass fabric around neck and chest, the shield gives all-around protection from electric burns, hot-metal burns from flying sparks of copper, and visual injuries from ultraviolet and infrared radiation.

Protective coatings in color chart

Containing 21 color chips, color chart emphasizes the current trend to brighten the interior and exterior of plants and at the same time protect it from chemical attack.

In addition to the color ranges available, another feature has been added to the chart: The chemical resistance of each pigmented color is shown for acid, alkali, oxidizing and weathering environments.

(Chart No. 5 is available from Carboline Company, Dept. P&PSE, 32 Hanley Ind. Ct., St. Louis 17, Mo.)
Circle 9839 inside back cover.

Contains basic data on annunciators

Containing basic engineering data, 36-page illustrated catalog gives a great amount of information on the operation and application of annunciator systems for various industrial uses.

Such systems are employed to provide continuous and automatic surveillance of pipelines, power generation and distribution.

(Catalog No. 659 is issued by The Scam Instrument Corporation, Dept. P&PSE, 1811 West Irving Park Rd., Chicago 13, Ill.)
Circle 9840 inside back cover.

How to handle via overhead

An idea book listing hundreds of applications in many industries, 56-page catalog features engineered overhead handling systems of track, cranes, trolley, switches and other electrification, as well as both heavy- and light-duty monorail systems.

(Bulletin C-2 is issued by American Monorail Company, Dept. P&PSE, 1111 E. 200th St., Euclid, Ohio.)
Circle 9841 inside back cover.

Fast way to clean tanks, plants

Four-page bulletin presents a complete round-up on equipment for cleaning plants and tanks.

Six models for heavy-duty cleaning of walls, floors, and process equipment are presented.

Also included are three models for cleaning entire inside area of tank cars, tank trucks, ships' tanks or stationary tanks.

Two other items are described — steam injectors for steam boilers and manually operated positive shut-off valves.

(Bulletin 442 is issued by Sellers Injector Corporation, Dept. P&PSE, 1600 Hamilton St., Philadelphia 30, Pa.)
Circle 9842 inside back cover.

Shows many different kinds of transformers

Twelve-page bulletin describes full line of medium transformers. Construction features and application data are given for: 501 to 5000 kva, single-phase, and 501 to 7500 kva, three-phase and LTC, 69kv and below; open and sealed dry-type, 300 kva and above, three-phase, 601 to 15,000 volts; distribution equipment transformers, 112½ to 500 kva, three-phase, 601 to 15,000v, oil or "Pyranol" filled; and integral distribution centers, 112½ to 2000 kva, liquid-filled, 300 to 2000 kva dry-type, 601 to 15,000 volts.

(Bulletin GEA-6984 is issued by General Electric Company, Dept. P&PSE, Schenectady 5, N. Y.)
Circle 9843 inside back cover.

"This is your last warning about lunch hour gambling."

Throw-away filter catches odors

A disposable activated-carbon odor-filter is introduced in four-page bulletin.

The unit combines high-efficiency odor removal with a high degree of air cleaning in one low-cost unit.

(Bulletin No. 220 is issued by American Air Filter Co., Inc., Dept. P&PSE, 215 Central Ave., Louisville 8, Ky.)
Circle 9844 inside back cover.

Storage water heater is gas-fired

Indirect gas-fired storage water heater — recently placed on the market — is subject of 20-page bulletin which describes design, operation and construction of the completely packaged unit.

Diagrams and schematic drawings are used to define the three basic systems of the unit — the gas-burning unit, forced-circulation transfer fluid system, and the service water system — and complete information is provided on operational principles, including scale-free heating, automatic controls, safety devices, efficiency, quietness and versatility.

(Bulletin 4 is issued by The Patterson-Kelley Company, Inc., Dept. P&PSE, East Stroudsburg, Pa.)
Circle 9845 inside back cover.

Describes lubrication for outdoor machinery

Sixteen grades of an all-weather, open-gear lubricant for outdoor equipment are listed in pamphlet giving grade recommendations.

The various grades and consistencies described contain either colloidal graphite, colloidal molybdenum or non-graphited grades.

("Gredag" pamphlet is issued by Gredag Department of Acheson Colloids Company, Dept. P&PSE, Port Huron, Michigan.)
Circle 9846 inside back cover.

Diesel electric generating set

Line of heavy-duty diesel engine-driven generating sets provide continuous source of electricity for all types of heavy operations — oil fields, construction sites, mining camps, railroads and light construction jobs, too.

Specifications and illustrations of these compact sets — in sizes ranging from 3,000 to 6,000 watts (air-cooled) and from 10,000 to 230,000 watts (water-cooled) — are included in the 4-page folder. Diesel-driven marine electric generating plants are also described, as are a complete selection of accessories and controls.

(Diesel Folder F-142 is available from D. W. Onan & Sons, Inc., Dept. P&PSE, Minneapolis 14, Minn.)
Circle 9847 inside back cover.

Wet-back boiler

A three-pass power and heating unit with all wet-back construction is described and illustrated in six-page, fold-out bulletin.

In addition to mechanical and thermal features, certified results of operational tests are given for these units which can be built in sizes up to 900 horsepower.

(Bulletin B-3240 is issued by Titusville Iron Works Division of Struthers Wells Corporation, Dept. P&PSE, Titusville, Pa.)
Circle 9848 inside back cover.

Industrial fan data given

Industrial fan bulletin features complete rating tables for the entire line, gives volumes of delivered air, rpm, horsepower at various static pressures, and outlet velocity and velocity pressures.

Other tables give correction ratios for deviations from standard atmospheric conditions at sea level and material specifications. Graphs are used to present a typical fan performance curve and to represent the friction of air in straight ducts in terms of cubic feet moved per minute.

(Bulletin L-5 is issued by Lehigh Fan & Blower Division, Fuller Co., Dept. P&PSE, Catasauqua, Pa.)
Circle 9849 inside back cover.

Iron valves in circular

Service ratings, sizes and dimensions, and material specifications for iron-body gate valves are featured in 2-color, 5-page circular.

Valves are applicable to numerous industries including the construction, gas transmission, chemical, and electric fields.

Higher strength cast iron wedge gate valves for use on many lines carrying steam, water, oil and gas are also included.

(Iron Valve Circular is issued by Walworth Co., Dept. P&PSE, 750 Third Avenue, New York 17, N.Y.)
Circle 9850 inside back cover.

Lighting supports for industry

Channel type lighting supports for installing wiring and electrical lighting fixtures in plants, industrial and commercial buildings are described and illustrated in 8-page bulletin.

Recommendations for applications in new and old buildings, installation procedures, features and data about the surface raceway system are given.

The simplex system for fixture support, junction boxes and fittings for complete assembly, and an assortment of fasteners for anchoring the channels to structural members of wood, concrete and steel are explained.

(Bulletin G-2 is issued by Steel City Electric Co., Dept. P&PSE, 1207 Columbus Avenue, Pittsburgh 33, Pa.)
Circle 9851 inside back cover.

Electric clips & insulators

Eight-page catalog describes line of solid copper and cadmium-plated steel clips and flexible dielectric insulators to fit.

Covering entire line — from miniaturized clips to welding ground clamps — catalog includes skin-tight insulators to fit wider range of clips, colored insulators, and alligator clip adapted for 'phone tip or test prod tip.

(Catalog No. 220 is issued by Mueller Electric Company, Dept. P&PSE, 1565G East 31st St., Cleveland 14, Ohio.)
Circle 9852 inside back cover.

Flexible coupling bulletin

Roller chain flexible couplings bulletin outlines advantages including: simple, all-steel construction that assures long life and maximum service; accommodation of angular and parallel misalignments with minimum backlash; and easy installation or removal.

Installation and maintenance procedures are illustrated.

(Bulletin 597 is issued by Chain Belt Company, Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9853 inside back cover.

AC timing motors are reversible

Line of compact, AC timing motors, designed for applications where ease of reversing is the main requirement, is discussed in two-page bulletin.

The synchronous characteristic of these hysteresis type motors assures an accuracy on the same order as the power source. Operation can be on single-phase supplies, using a phase shift network supplied with one winding, or on two-phase supplies.

(Bulletin AWH MO-807 is issued by A. W. Haydon Company, Dept. P&PSE, Waterbury, Conn.)
Circle 9854 inside back cover.

NEW SAFETY TREAD

Super-Stairmaster is the new heavy duty aluminum safety stair tread that repairs and modernizes worn or slippery stairs now available from Wooster Products Inc., Wooster, Ohio.

The new abrasive "TRAFFIC-FLOW" design of the Super-Stairmaster has a magnetic-like grip which provides safe, sure traction on commercial—industrial—institutional stairs and is 100% effective under dangerous wet or oily conditions. Perfect safety for ladies' high heels is a feature of interest to managers of buildings open to the public. The treads are rugged and outwear concrete, stone or marble. Easily applied over all types of stairs. Cleans with once-over-sweeping or vacuum.

Approved and recommended by Safety Engineers. Guaranteed by Warranty Bond.

Complete information on Super-Stairmaster and the repair of stairs by return mail. Write Stairmaster, Dept. S-19, Wooster Products Inc., 100 Spruce St., Wooster, Ohio.

Circle 9855 inside back cover.

HOLDING POWER

Where You Need It!

With WILCOX Self-Sealing GASKETS

When the pressure is on and you need dependable holding power in your lines, you can rely on Wilcox Self-Sealing Gaskets. Over the years, they have proved their outstanding performance. The U-shaped metal outer cover is packed with a resilient filling, usually rubber or asbestos. Pressure exerted on this filling forces it into the cover, putting force against adjacent flange surfaces. Thus, pressures that tend to blow ordinary gaskets make the Wilcox tighter.

Available with covers of copper, lead, tin, aluminum, monel, stainless steel, etc. in all sizes, standard or special.

Write for Bulletin No. 569 and prices.

CHICAGO-WILCOX MFG. CO.

7725 South Avalon Avenue
Chicago 19, Illinois

Circle 9856 inside back cover.

Sewage surge relief valve

Sewage pressure relief valve used to protect sewage lines against excessive overpressures is described in four-page bulletin.

The valve will open immediately when the line pressure exceeds the setting of the two counterweights, which are adjusted to suit field conditions. The valve "cushions" slowly to the closing position and shuts tightly when the system pressure is restored to normal.

(Bulletin SEW—One is issued by Golden-Anderson Valve Specialty Co., 1232 Ridge Avenue, Pittsburgh 33, Pennsylvania.)
Circle 9857 inside back cover.

Why recirculated gas

Recirculated gas method for obtaining the proper proportioning of heat within a steam generator is subject of 16-page bulletin.

Recirculated gas is defined as the process by which gas from the boiler, economizer or air heater outlet is reintroduced to the furnace by means of a suitable fan and ducts.

(Bulletin G-96 is issued by The Babcock & Wilcox Company, Dept. P&PSE, 161 E. 42nd St., New York 17, N. Y.)
Circle 9858 inside back cover.

Free-piston pump in folder

Air-operated pump that handles anything that flows from molten metals to ice cream is described in 4-page folder.

The pump which has no moving parts such as a motor or engine, drive shaft or belt, packing or seals, continues to operate even while partially disassembled for cleaning or maintenance.

(Pump folder is issued by The Crossley Machine Co., Dept. P&PSE, 308 Monmouth Street, Trenton 9, N. J.)
Circle 9859 inside back cover.

advertisers' index

A

Airetool Manufacturing Company 27
Arkomatic Valve Company, Inc. 35

B

Barksdale Valves, Pressure Switch Division 32

C

Chicago-Wilcox Mfg. Co. 41
Cobra Metal Hose 10
Crane Co. 32

G

Globe Company, The, Products Division ..... 3rd Cover

I

Irving Subway Grating Co., Inc. 12

J

Johns-Manville 8-9
Johnson Corporation, The 37

L

Liquidometer Corp., The 6

M

Multi-Amp Division, Multi-Amp Electronic Corporation 11

N

Nagle Pumps, Inc. 32
Niagara Blower Company 10

P

Palmer Thermometers, Inc. 25
Powers Regulator Co., The 31

S

Smith Corporation, A. O. 11
Sorgel Electric Company ..... 4th Cover

U

Union Asbestos & Rubber Co. 12

V

Vogt Machine Co., Henry ..... 2nd Cover

W

Wooster Products Inc. 41

Y

Yarnall-Waring Co. 7

PLANT and POWER SERVICES ENGINEER

. . . which has developed from POWER INDUSTRY, INDUSTRIAL POWER and INDUSTRY POWER . . . serves the key men responsible for plant and power services throughout all industry, including utilities, and also in complexes of public institutions, schools, hospitals, etc.

The function of these plant and power services is to create and maintain the environment and provide the facilities necessary to effective operation of these industries and/or buildings, regardless of variety of products manufactured or uses of buildings.

The plant services include lighting, heating, ventilating, refrigeration, water supply and treatment and other conditions and material services needed for directed activity.

The power services include production, transmission and application of all forms of energy — steam, electrical, mechanical, pneumatic, hydraulic, atomic — and the engineering and maintenance necessary for its continuance in:

- **MANUFACTURING AND INDUSTRY**
  - Chemical and process industries
  - Electrical and industrial machinery
  - Food and kindred products
  - Central utility stations and engineering headquarters
  - Textile manufacture
  - Gas companies and pipelines
  - Lumber and wood products
  - Waterworks
  - Metal industries
  - Stone, clay and glass products
  - Atomic energy
  - Transportation equipment
- **PUBLIC SERVICES AND LARGE INSTITUTIONS**
  - Hospitals
  - Office buildings
  - Hotels
  - Schools and colleges
  - Marine
- **CONSULTANTS**
  - Consulting engineers
  - Industrial architects and contractors

Advertising Representatives

RICHARD H. PUTMAN — Sales Manager

CHICAGO 11, ILLINOIS, Richard H. Putman, Philip T. Clark, 111 East Delaware Place, WHitehall 4-6141

CLEVELAND 9, OHIO, 5414 Archmere Ave., SHadyside 1-9452

LOS ANGELES 57, CALIFORNIA, Wettstein, Nowell, & Johnson, Inc., Jerry Holtz, 672 S. La Fayette Park Place, DUnkirk 8-2286

NEW YORK 17, NEW YORK, Fred S. Brandt, Eastern Sales Manager, William J. Prohovich, 369 Lexington Avenue, MUrray Hill 6-7738

PHILADELPHIA, PENNSYLVANIA, William J. Prohovich, District Manager, 729 School Line Drive, King of Prussia, Pa., BR 5-2589.

PITTSBURGH 22, PENNSYLVANIA, 544 Oliver Bldg., ATlantic 1-2783

PORTLAND 5, OREGON, Wettstein, Nowell, & Johnson, Inc., 337 Pittock Block, 921 SW Washington St., CApitol 8-4107

SAN FRANCISCO 8, CALIFORNIA, Wettstein, Nowell, & Johnson, Inc., Jerry Nowell, Gene Watts, 355 Stockton St., YUkon 2-9537

SOUTHEASTERN STATES, Joe H. Howell, 40 Peachtree Place, N.W., Atlanta 9, Georgia, TRinity 2-2235

THAT'S INTERESTING

From inside front cover

The installation involves a system of sending air from shore to the sea-bed, and distributing it there so that it breaks the rhythm of normal wave action. This creates an area of random turbulence, resulting in quieter water.

The new type of breakwater was developed by Pneumatic Breakwaters Ltd., of London.

Out of the past

"Step back and look" because the electric automobile and street truck once thought to be relics of the past might be on their way back according to Electric Storage Battery Co., Philadelphia, which has assisted in engineering planning for the first new electric vehicles to appear this year.

The basic design of the Exide-Ironclad batteries which will power the new vehicles is distinguished by tubular positive plates. But, their electrical capacity ability to provide surges of power, and length of service life have been increased far beyond standards acceptable in the days of the old electric runabout.

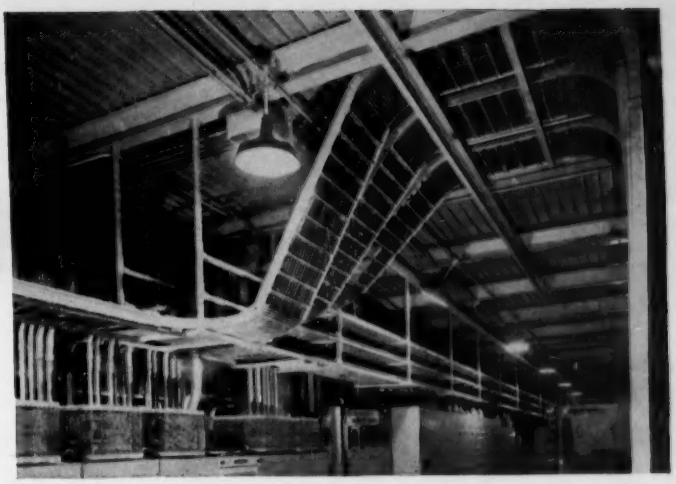
Flash in the cave

A midget photoflash unit for use in coal mine photography has been pronounced safe by the Bureau of Mines, Department of the Interior.

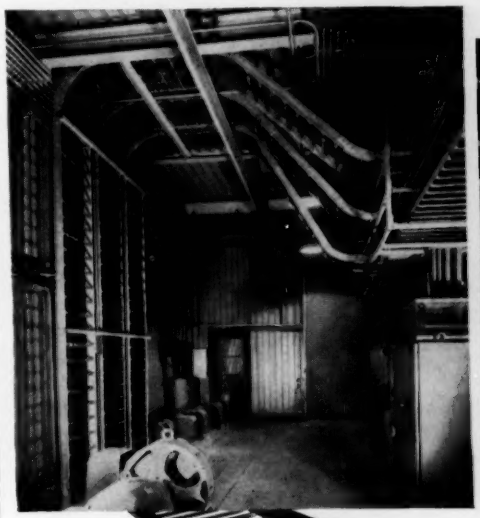
Tested under exacting safety conditions in Bureau laboratories, the midget unit proved it would not ignite explosive atmospheres of methane and air, methane being the explosive gas encountered in many coal mines.

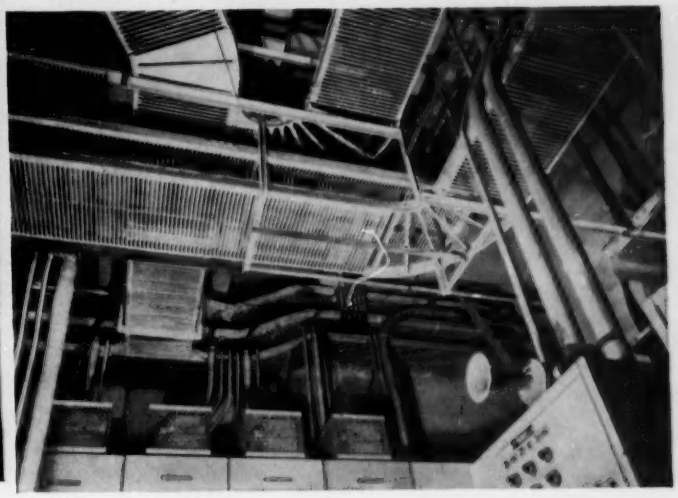
Unit contains its own battery power supply and features an electrical interlock which makes the internal circuit safe when the flash bulbs are removed.

how INLAND STEEL uses GLOBE INTERCHANGEABLE TRAYS to support cables in their Indiana Harbor Plant



★ Engineered for Uniform Design and Easy Installation ★ Steel or Aluminum Construction
★ Complete Accessories for SPEEDIER Installation ★ Complete Interchangeability
★ No Sharp Edges to Damage Cables





Globe's two types of cable trays, one a ladder type and the other a basket type, to support cables, wiring and tubing have become increasingly popular because they can be used INTERCHANGEABLY at any given location depending on the type and weight of the cables to be suspended. The advantages of each type tray can be used to the fullest. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is used for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants and for power distribution in all types of manufacturing processes. Send for FREE catalog giving full information and installation techniques.

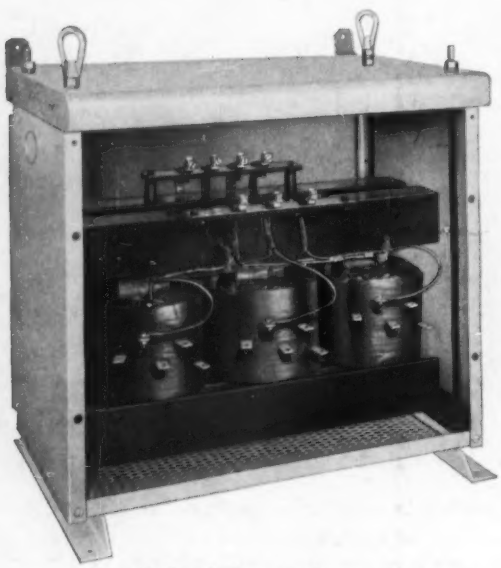
PRODUCTS DIVISION
THE GLOBE COMPANY Manufacturers since 1914
4036 S. Princeton Ave., Chicago 9, Ill.

Representatives in all principal cities . . . consult the yellow pages in your phone book under "Conduits" for the one nearest you.

Circle 9860 inside back cover.

When you select dry-type transformers initial costs can be false economy

SORGEL
SOUND-RATED DRY-TYPE
TRANSFORMERS



45 Kva 3-phase transformer with taps. Interchangeable wall or floor mounting. Front panel removed, showing interior.

●

COMPLETE LINE FOR EVERY PURPOSE up to 10,000 Kva, up to 15,000 volts, including special transformers and saturable reactors.

The same quiet SORGEL transformers are also incorporated in substations. Procurable with any type or make of switchgear, or from any electrical manufacturer.

The first cost of dry-type transformers is not always the final cost. Don't be misled; the lure of lower prices often camouflages operating and installation costs. SORGEL SOUND-RATED DRY-TYPE TRANSFORMERS are designed and constructed for long life. They provide the absolute ultimate in operating efficiency, ease of installation, overload capacity and long-range economy.

SORGEL offers these proven advantages

LOWER COPPER LOSS — Coils are liberally designed for the most effective use of the latest developments in insulating materials, have large air ducts for low hot spot temperature and are vacuum-impregnated to provide a co-ordinated insulation system.

LOWER CORE LOSS — Cores are designed with the industry's lowest magnetic flux densities, resulting in low core loss and the lowest sound level. The entire unit is secured within a substantial frame. Large units are mounted on vibration dampers to minimize vibration transmission to adjacent areas.

QUICKER AND EASIER INSTALLATION — The enclosure is self-supporting and entrance can be made on sides, top, bottom or back. Connecting is made easier by means of solderless connectors on terminal blocks in roomy connection compartments. Units up to 75 Kva single phase and 45 Kva 3-phase, are furnished for interchangeable wall or floor mounting.

Over 43 years experience in the development, manufacturing and application of transformers, has made these achievements possible.

You will be doing your company or customer a great service when you select the best dry-type transformer made only by . . .

Sorgel Electric Company

841 W. National Avenue, Milwaukee 4, Wisconsin

Sales engineers in principal cities.

Consult the classified section of your telephone directory or communicate with our factory.

Plant-Power Services Engineer

. . . published by . . .
Putman Publishing Company
CREATORS OF
READER ACTION
MAGAZINES

. . . featuring all these essential elements:

- TERSE VITAL EDITORIAL
- HAND-PICKED CIRCULATION
- "EXECUTIVE" FORMAT
- HIGH VISIBILITY
- QUALITY READERSHIP
- MORE READER ACTION